UNIVERSITY OF GONDAR

COLLEGE OF MEDICINE AND HEALTH SCIENCES

INSTITUTE OF PUBLIC HEALTH

ASSESSMENT OF OCCUPATIONAL INJURY AND ASSOCIATED FACTORS AMONG MUNICIPAL SOLID WASTE MANAGEMENT WORKERS IN GONDAR TOWN AND BAHIRDAR CITY,NORTH WEST ETHIOPIA,2012

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GONDAR - ETHIOPIA

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APPROVED BY THE EXAMINING BOARD

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Abstract

Introduction: Worldwide, over 270 million job-related injuries and illnesses are occurred each year. The economic loss related to these accidents and diseases are estimated to be 4% of world gross national product. The fatal occupational accidents are about 358,000 every year. Work related injuries cause an estimated number of 3,400,000 disabling injuries. Each weekday a fatal injury occurs every 2 hrs and a disabling injury every 8 hrs.
In Ethiopia over 5,596 fatal occupational accidents happen annually. Approximately 4,270,815 work-related accidents took place that causes at least 3 days absence from work. The accident rate per 100,000 workers is 16426 and the fatality rate is 21.5 per 100,000 workers

Objective of the Study: To assess occupational injury and associated factors among municipal solid waste management workers in Gondar town and Bahirdar city, North West Ethiopia, 2012.

Methods: Cross sectional study design was conducted to assess occupational injury and associated factors among municipal solid waste management workers in Gondar town and Bahirdar city, North West Ethiopia, 2012. Four hundred eighty two workers were taken as study subjects and data was collected by face to face interview.

Result: the overall annual prevalence rate of work related injury was 63.9 %.The one month period incidence, on another hand, was 11.7%. The severity of injury was also assessed by days lost due to injury: 110(35.7%) workers had non-serious accident which requires 1- 3 days' absence from work and 77(25%) workers had serious accident which requires more than 3 days' absence from work.

Conclusion: In the study areas, high prevalence of work related injury (63.9%) was reported. And old age, low educational status, engaged in two or more work categories, absence of health and safety training, Provision/utilization of personal protective equipments, sleeping disorder and alcohol consumption were identified as factors associated with work related injury.

Recommendation: For sustained prevention and control of work related injuries the employer should Provide waste collectors with suitable and complete protective equipments, such as gloves, face masks, overalls, and rubber boots; Change the refuse collection containers from bags and bins to two or four wheeled containers; Provide training programs at the onset of hiring, and on an ongoing basis to educate all waste collectors about hazards, injuries, and their reduction and prevention.

ABBREVIATIONS

AOR = Adjusted odds ratio

BSc = Bachelor of Science

C.I = Confidence interval

CSA = Central Statistical Agency of Ethiopia

Env't = Environment

Hrs =Hours

ILO = International Labor Organization

Kg = Kilogram

MD = medical doctor

Ml = milliliter

MPH = master of public health

MSIs = Musculoskeletal injuries

MSQ = Minnesota Satisfaction Questionnaire

MSWM = Municipal solid waste management

MSWWs = Municipal solid waste workers

OR =Odds ratio

OSHA = Occupational Safety and Health Administration

PPEs = Personal protective equipments

RS = registered sanitarian

SMI =Sleepmed Insomnia Index

SPSS = Statistical Package for Social Science

U.S = United State of America

WHO = World Health Organization

WRIs = Work-related injuries

Yrs = years

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1. INTRODUCTION

1.1. Statement of the Problem

Work-related injuries (WRIs) and illnesses are multi-factorial and remain major problems of public health magnitude requiring the attention of all stakeholders (1-2)

The International Labor Organization (ILO) estimates that 270 million occupational accidents and diseases occur each year. The annual cost for workers compensation in 2007 was $85 billion (3). The economic loss related to these accidents and diseases are estimated to 4% of world gross national product (4-6).

Work related accidents and injuries are a source of substantial human and economic cost. Available data reveal an alarming and extremely high rate of work related deaths and injuries in both the developed and developing nations. Work related injuries cause an estimated number of 3,400,000 disabling injuries. Each week day a fatal injury occurs every 2 hrs and a disabling injury every 8 hrs (7-8)

ILO estimates that each year around 2.3 million workers die as a result of occupational accidents and work-related diseases and fatal occupational accidents are about 0.35 million every year and fatal work-related diseases are around 1.95 million per year (9-10).

The number of occupational accidents and diseases are increasing in many developing countries. It has been estimated that over 120 million industrial accidents with over 200,000 fatalities occur each year in these nations. This is the area which has 80% of the world's labor force. Sub-Saharan Africa appears to have the greatest rate per worker of occupational injuries followed by Asia(3, 5).

In Sub-Saharan Africa countries slightly more than 54, 000 fatal occupational accidents happen annually. Approximately 42 million work-related accidents took place that

causes at least 3 days absence from work. The fatality rate of the region is 21 per 100,000 workers and the accident rate per 100,000 workers is 160,00(11).

In Ethiopia over 5,596 fatal occupational accidents happen annually. Approximately 4,270,815 work-related accidents took place that causes at least 3 days absence from work. The accident rate per 100,000 workers is 16426 and the fatality rate is 21.5 per 100,000 workers(11).

The extent of work related injuries and diseases which are the major problems of the globe is varied from different types of occupation. For example solid waste management is the sixth hazardous occupation next to Fishery, Loggers, Pilots and Flight Engineers, Iron and Steel Workers, Ranchers and Farmers with incident rate of 35.5 per 100,000(12). Therefore, the potential health effects of both waste itself and the consequences of managing it have been the subject of a vast body of research.

1.2. Literature review

1.2.1. Definition of solid waste and solid waste management

A waste is viewed as a discarded material, which has no consumer value to the person abandoning it. According to World Health Organization, (WHO) the term ‘solid waste’ is applied to unwanted and discarded materials from houses, street sweepings, commercial and agricultural operations arising out of mass activities. As a result waste is a complex mixture of different substances, only some of which are intrinsically hazardous to health (13-15).

The generation of waste and the collection, processing, transport and disposal of waste the process of ‘waste management’ is important for both the health of the public and aesthetic and environmental reasons(13-14, 16-17).But all activities in solid waste management(SWM) involve risk, either to the worker directly involved, or to the nearby resident. Risks occur at every step in the process, from the point where residents handle wastes in the home for collection or recycling, to the point of ultimate disposal. Health risks from waste management are caused by many factors, including:

- The nature of raw waste, its composition (e.g., toxic, allergenic and infectious substances, broken glasses, serrated edges of tin cans, knives protruding as bags are lifted or swung and hypodermic needles), and its components (e.g., gases, dusts, leachates, sharps);
- The handling of waste (e.g., working in traffic, shoveling, lifting, equipment vibrations, accidents);
- The processing of wastes (e.g., odor, noise, vibration, accidents, air and water emissions, residuals, explosions, fires);
- The disposal of wastes (e.g., odor, noise, vibration, stability of waste piles, air and water emissions, explosions, fires)(15, 18).

1.2.2. Magnitude of problem of waste management practices on health

There is a large body of literature on the potential adverse health effects of different waste management options (13).Municipal solid waste workers (MSWW) are daily exposed to unquantifiable amounts of physical, biological, chemical, mechanical, and psychosocial hazards. Work related fatalities and occupational injuries rank this highly privatized and profit-driven industry as the fifth most dangerous industry in the U.S., even more dangerous than the job of a police officer or fire fighter(1, 12, 19). A study conducted on injury associated with solid waste management found that 41% of the waste collectors had one or more injuries (20).

A sanitation worker is ten times more likely to die on the job than the average worker, and garbage collectors and landfill workers are also about twice as likely as the average worker to suffer a work-related illness or injury according to the Bureau of Labor Statistics (21).

MSWW suffer from various forms of injuries and illnesses, ranging from respiratory disorders due to inhalation of bioaerosols and various gaseous and volatile chemical/organic compounds, to skin diseases and the most common musculoskeletal disorders (18, 22-23).

A five-year (2003-2007) retrospective review of Occupational Safety and Health Administration (OSHA) in united state of America conducted on municipal solid waste workers (*n* = 1895) analyzed that , Musculoskeletal injuries (MSIs) were in the majority, with injuries involving the back (20%), hand (12%), shoulder (10%), knee (8%), leg (6%), and ankle (6%) predominating. Almost all parts of the body were involved in injuries as indicated by arm (5.5%), groin/hip (4%), foot/wrist (3.5% each), and neck (3%). The most common cause of injury was lifting (17.5%). This was followed by slips/trips (10.5%), contact with objects in the waste (10%), repetitive motion (6.2%), and awkward body posture (6.2%), fall to a lower level (5.8%), pulling/pushing (5%), and contact with waste equipment (5%). Trapping or pinching of body parts between two objects or surfaces (3%) (e.g., fingers trapped between the doors of a roll-off box or

between a waste container and the waste vehicle), falling objects (3%), falls on the same level (2.5%), and flying objects (2.5%) also resulted in non-fatal occupational injuries (NFOI). Injuries from waste vehicles (3%) and non-waste vehicles (2%) were also documented. Sprains and strains (55%), abrasions/bruise/contusions, (14%) and cuts/ lacerations (10%) were the leading injuries experienced by the employees. These findings are supported by other studies in Brazil, Australia (9, 23-25).

Another study conducted on solid waste management workers at Calicut(n = 313) in 2010 also showed that, joint problems are very common Since the waste collectors have to carry and lift load while collecting**,** loading and unloading the waste to or from the collection vehicle. The commonly affected joints are : Low back with the prevalence of 37.8% , Neck (18.5%) ,Shoulder (33.9%) , Elbow (27.7%) , Knee (42% and Ankle (25%)(26).

Refuse collection is a hazard laden job. Such hazards include injuries from sharp objects such as broken glasses, serrated edges of tin cans, knives protruding as bags are lifted or swung and hypodermic needles. These needles might be carrying other people's blood possibly contaminated with a number of viruses. A cross sectional study conducted in Nigeria during 2007 (n = 279) supported this idea. This study showed that, two hundred and thirteen (76.3 %) of respondents had sustained injuries from sharp objects in the course of packing refuse with bare hands (27).

In Nepal a field survey (n = 61) was conducted from 2004 – 2005 to examine occupational health problems of waste workers. Significantly high proportions of waste workers are experiencing varieties of physical injuries (like cuts, bruises and ruptures in the body, back pain, joint pain, elbow injury, wrist pain and other physical pains and aches) , allergic problems (like Skin rashes , Irritation , Swelling , Eyelid burning) .This study indicated that, 20 (67 %) of sweepers , 11 (65 %) of collectors and 6 (42 %) of loaders have 4 or more than 4 times physical injuries per week(15).

On the other hand a field study (n =24) was conducted in Hong Kong during 2011 to assess occupational safety and health problems of workers in three recycling industries and the result showed that all the workers in the three companies had MSIs with more than one body locations at 'mild' and 'moderate' levels. The main MSIs were with the shoulders (58.3%) and the back (50%)(28).

A study conducted in Australia revealed that 14% of the total injury claims were made by garbage collectors. This increased to 25% for long term injury claims. Forty seven percent of these relevant injuries resulted in muscular strain. Back injuries accounted for 25% of these injuries; leg injuries 20%; hand injuries 9% and shoulder/neck injuries 21%. The study generalized that *refuse collectors are 1.9 times more likely to develop MSIs than the rest of the population(29).*

In fact there are a number of studies on occupational or work related injuries on construction workers, health professionals , low and medium industries(agricultural, garage, wood work), no similar studies are conducted to assess occupational injuries among municipal solid waste workers in Ethiopia.

1.2.3. Factors related to work related injuries

Many authorities believe that work-related injuries result from a complex interplay of multiple risk factors. These Risk factors for occupational injury can be grouped into three broad categories:

A. **Human factors** (includes variables such as job preference, experience, physical attributes and impairments, stress reactions, knowledge, perception, and attitudes)(30).
B. Socio demographic factors (sex of workers, age of workers, level of education and salary of workers)
C. **Work content and environment** (refers to the design of tasks, how tasks are organized into jobs, how jobs are scheduled job category and length of

employment) and environment (includes social and organizational factors and physical stressors (27, 31-34).

A study conducted in America to Occupational fatalities among older workers in the United States showed that workers aged ≥55 years are at greater risk for occupational fatalities than are younger individuals. Older workers may also have longer disability and are less likely to return to work after an occupational injury (35). Other studies conducted to assess Injuries among solid waste collectors in the private versus public sectors also showed that solid waste collectors with the highest frequency of injuries was in the age group 35–44 year old group in the public sector(36-39).

Most occupational health and safety studies conducted in developing countries revealed that increasing educational levels have been associated with decreasing work related injuries. Education is likely to enhance workers health and safety practice, education can increase aware of the potential hazards and the health impacts related to wastes collecting methods that prevent them from work related injuries(40-41).

A study conducted in china analyzed, from 199 male and 48 female workers who took <50ml per day , 31 (15.6%) and 7 (14.6 %) are injured .Where as 46 (19.4 %) males out of 237 and 4(25.0 %) females out of 16 who consumed more than 50 ml per day were injured respectively(42).

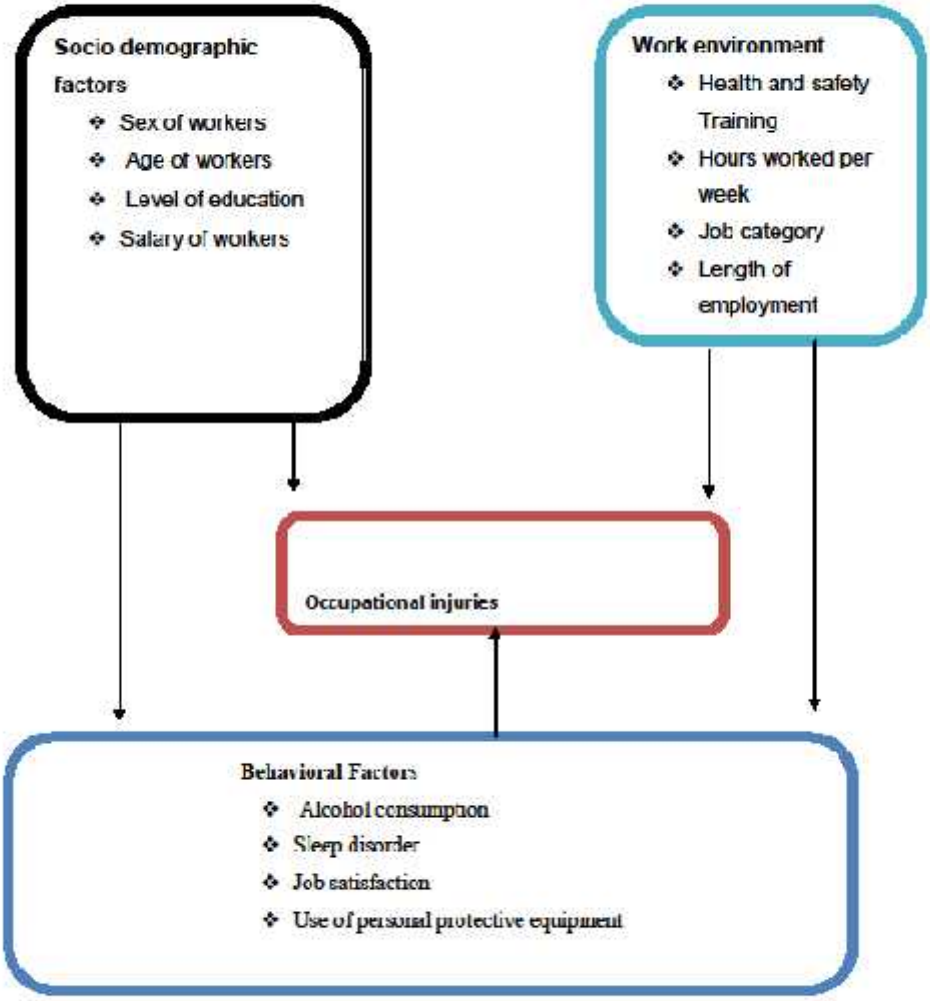
Work load is also another determinant of work related injury. As different studies suggested; workers having work load or two or more job categories were subjected to work burden, restless work and had exposed with different hazardous agents. A study conducted in Canada and other studies conducted to assess work injury stated that workers who worked in two or more job categories had the highest frequency of work related injury(43-44).

Different investigators showed that there is difference in the rate of work related injuries in service year. International labor organization XXX/2003 reported that Fatal accidents

usually occur to workers who could still have had a long working career ahead of them (45). Similar studies also strongly agree with this idea(37, 45-46).

Most occupational health and safety studies conducted in developing and developed countries showed that sleeping pattern of workers is determinant of work related injury. A study conducted in Japan to assess sleep related risk of occupational injury in small and medium scale enterprises analyzed that sleepiness and reduced vigilance could be some of the most important risk factors for traffic and industrial accidents. Sleep loss, insufficient sleep during the night or having poor sleep habits undoubtedly induce sleepiness which could affect daytime functioning and performance and possibly impair safety at work. As sleep problems such as insomnia are highly prevalent (20–30%) in most industrialized countries(47-48).

A Conceptual Framework for study of Work-related injury prevalence (adapted from reference (7, 24, 27, 30).



figre1: Determinants of work related injury among municipal solid waste management workers in Gondar town and Bahirdar city, 2012.

1.3. Justification of the study

- Activities in solid waste management starting from onsite handling to disposal involve risk to the workers especially in developing countries as:
  - The Collection is by labor-intensive systems,
  - Workers have less protection ,
  - Most waste is not safely contained in readily lift able load sizes,
  - Recycling is conducted from mixed waste rather than from segregated materials at source,
  - Poor hygiene practice of the workers.

- The occupational injury risks associated with solid waste collection, processing, recycling, and disposal are:
  - ✓ Back and joint injuries from lifting heavy waste filled containers and driving heavy landfill and loading equipment;
  - ✓ Infections from direct contact with contaminated material, dog and rodent bites, or eating of waste fed animals;
  - ✓ Puncture wounds leading to tetanus, hepatitis, and HIV infection;
  - ✓ Eye trouble and
  - ✓ Dermatological problems.
- In developing countries including Ethiopia, the health related issues of solid waste management and the risk factors still need to be addressed.
- Therefore this study will play its own role in the identification of the risk factors, and in the adoption of controlling and preventing strategies of occupational injuries associated with solid waste management among waste collectors.
- Furthermore it may also act as a guide line data for future studies.

2. OBJECTIVES

2.1. General Objective

To assess occupational injury and associated factors among municipal solid waste management workers in Gondar town and Bahirdar city, north West Ethiopia, 2012.

2.2. Specific Objectives

- ☞ To determine the prevalence of occupational injury among municipal solid waste management workers.
- ☞ To determine the severity of work related injury among municipal solid waste management workers.
- ☞ To identify factors associated with occupational injury among municipal solid waste management workers.

3. METHODS AND MATERIALS

3.1. STUDY DESIGN

A cross sectional study was conducted to assess occupational injury and associated factors among municipal solid waste management workers in Gondar town and Bahirdar city, April - 2012.

3.2. Study area and study period

The study was conducted in Gondar town and Bahirdar city from April 01 – 30/2012.

Gondar town, the capital of North Gondar zone in Amhara regional state, is located 750km North-west of Addis Ababa. It is situated between 12°36′N and 33°28′E at an altitude of about 2300 m above mean sea level with an average temperature of 20°C and an average annual rainfall of 1800 mm. According to the 2007 Ethiopian census report, Gondar has a total population of 206,987 and more than half (108,902) of them are females.

Bahirdar city, the capital of Amhara regional state, is located 578 km North-west of Addis Ababa, having a latitude and longitude of 11°36′N 37°23′E Coordinates: 11°36′N 37°23′E and an elevation of 1840 meters above sea level. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), this city has a total population of 221,991, of whom 108,456 are men and 113,535 women. Waste generation rate in the city is 0.223kg/d/capita with the following composition; Food - 86.6, Paper - 3.3, Plastic, leather and plastic - 2.2, Glass - 0.6, Textile - 2.2, Metals - 0.3 present by weight (49).

3.3. Source Population

All municipal solid waste management workers working in both private and government waste collection enterprises of Gondar town and Bahirdar city.

- **In Gondar town**
  - ✓ Atsie tege with 137 workers ,
  - ✓ Mersa with 37 workers and
  - ✓ waste pickers with 24 members
- **In Bahirdar**
  - ✓ Dream light with 160 workers
  - ✓ Arenguade raey with 31 workers
  - ✓ Street sweepers with 83 members and
  - ✓ Korari or waste pickers with 40 members were exist.

3.4. Inclusion and Exclusion criteria

Inclusion criteria: all municipal solid waste management workers of both sexes who engaged in each elements of solid waste management system.

Exclusion criteria: municipal solid waste management workers who had no direct contact with wastes, such as administrative staffs were not included in the study because by virtue of their occupation they were not exposed to occupational related injuries associated with solid waste management.

3.5. Study population

All municipal solid waste management workers (512) in Gondar town and Bahirdar city were taken as study participants.

3.6. Data collection procedure

Data were collected using pre-tested standard questionnaire which was developed based on the related published studies with certain modification. The questionnaire was prepared in English version and it was translated to Amharic and back to English to confirm the correctness of the translation .The questionnaire composed of four parts: socio demographic, injury characteristics, work environment and behavioral or personal variables. Interview was employed by data collectors to the whole waste collectors to collect the data. Three supervisors having BSc degree in environmental health science and ten data collectors participated in the data collection process. Training for data collectors and supervisors was also given for two days by the investigator. The questionnaire was pre-tested to identify potential problem areas, unanticipated interpretations and cultural objections to any of questions in 10% of respondents having similar characteristics with the study subjects in Woreta town. Based on the pre test results, the questionnaire was additionally adjusted contextually and terminologically, and was administered on the whole sample of waste collectors in April of 2012. Counter checking of daily filled questionnaire and regular supervision were made by principal investigator.

3.7. Data quality assurance

To ensure quality of data standardized questionnaire was developed from related published studies with little modification, training of data collectors and supervisors was made, the questionnaire was pretested on 52 waste collectors having similar characteristics with the study subjects in Woreta town who were not included in the study and necessary correction was done after the pre test. The completed questionnaires were handled by the supervisors on each day of data collection. After checking for consistency and completeness, the supervisors submitted the filled questionnaires to the principal investigator. Incorrectly filled or missed ones were sent back to data collectors for correction. Anything, which was unclear and ambiguous, was corrected on the next day of collection. Five percent of the samples were rechecked by supervisors whether the interviewers have done their job correctly or not. The collected data were double entered by principal investigator to verify accuracy.

3.8. Study variables

3.8.1. Dependent variable:

Occupational injury

3.8.2. Independent variables

1. **Socio demographic variables:** Sex, age, educational level, monthly salary.
2. **Work environment variables**: days/hours worked per week, working experience, job category, health and safety training, provision of PPEs.
3. **Behavioral variable**: alcohol consumption, sleep disorder, job satisfaction, and use of personal protective equipment.

3.9. Operational definitions

A. Injury: any physical damage of human body or tissue results from harmful contact between people and objects, substances, or other things in their surroundings.

B. Waste picker: is a person who picks out recyclable elements from mixed waste wherever it may be temporarily accessible or disposed of.

C. Musculoskeletal injury: physical damage of Musculoskeletal System (Muscles, Bones, Joints, Ligaments and Tendons.)

D. Utilization of PPEs: use of complete and suitable PPEs (hand glove, Toetector/feet wear, respirator, face mask, reinforced cloth, goggle and helmet) on duty.

E. Sleeping pattern: is measured by The SleepMed Insomnia Index (SMI)

- ✓ Normal or sleepy individuals (SMI scores 0–10),
- ✓ Non-sleepy individuals with nonrestortive sleep (SMI scores 11–20), and
- ✓ Insomnia individuals (SMI scores >20) [see annex V]

F. Job satisfaction: is measured by *Minnesota Satisfaction Questionnaire (*MSQ*).*

- Very Dissatisfied - The total sums of (MS scale) 25 – 37.50
- Dissatisfied - The total sums of (MS scale) 37.6 – 62.50
- Satisfied - The total sums of (MS scale) 62.60 – 87.50
- Very Satisfied - The total sums of (MS scale) 87.60 and 100 [See annex V]

G. Alcohol consumption:

Standard drink:

- 12-ounces of beer.
- 8-ounces of malt liquor.
- 5-ounces of wine.

- 1.5-ounces of distilled spirits or liquor (gin, rum, vodka, whiskey, areki etc).

(Conversion factor: 1 Milliliter = 0.0338140227 Ounces)

Moderate drinking: are generally defined as

- No more than 14 standard drinks in a given week for a healthy adult man.
- No more than 7 standard drinks in a given week for a healthy adult woman.

Heavy Drinking:

- **Men** who drink more than 14 per week and
- Women who drink more than 7 per week [See annex V].

3.10. Data management, processing and analysis

Data were entered using EPI INFO version 3.5.3/2011 statistical software and then exported to SPSS version 20.0 for further analysis. Descriptive statistics of the collected data was done for most variables in the study using statistical parameters: percentages, means and standard deviations. Bivariate analysis was used primarily to check which variables were associated with the dependent variable individually. Variables found to have association with the dependent variables were then analyzed by multivariate logistic regression for controlling the possible effect of confounders and finally the variables which had significant association were identified on the basis of AOR, with 95%CI.

3.11. Dissemination of results

The finding of the study will be submitted to Institute of Public Health of University of Gondar. It will also be communicated to North Gondar administrative zone and Bahirdar city municipality office, to North Gondar administrative zone and Bahirdar city Labor and Social Affairs office, to each studied waste collection enterprises and to those organizations concerned with the promotion of Occupational health and safety at workplaces. Peer reviewed publication will also be considered.

4. Ethical considerations

The study was carried out after getting permission from the ethical review committee of institute of public health, university of Gondar and the copy of permission letter was given for north Gondar administrative zone and Bahirdar city municipality. Then, data were collected after getting written consent from the municipality and the enterprises. Informed verbal consent was also obtained from each waste collection enterprise and study participants to conduct the study. Confidentiality was granted for information to be collected from each waste collection enterprises and study participants. Participants' involvement in the study was on voluntary basis; participants who were unwilling to participate in the study & those who wish to quit their participation at any stage were informed to do so without any restriction. Each respondent was informed about the objective of the study and privacy during interview was ensured.

5. RESULT

Out of 512 workers who had direct contact with solid waste, 482 respondents were interviewed to assess occupational injury and associated factors among municipal solid waste management workers in Gondar town and Bahirdar city. Of which 293(61%) were from Bahirdar and 189 (39%) were from Gondar town. During the collection, all workers were fully volunteer to participate in the study with 100% response rate. But 30 workers were absent because of delivery and annual leave. Data were collected on Socio demographic characteristics, Injury type, nature, cause, severity, work environment and behavioral characteristics of the respondents.

5.1. Socio demographic characteristics of respondents

From the total respondents, 379(78.6%) were female and 103(21.4%) were male with 1:3.7 male to female sex ratio. The mean age of the respondents was 30.56 years with standard deviation of 7.60 years (30.56 ± 7.60) and range 32 years(18 – 50 years).About 250(51.9%) of the workers were in the age group ≥30 years.The highest number of study participants,443(91.9%) were Orthodox Christian. Two hundred eighty five (59.1%) of the respondents were illiterate and 180(37.3%) were not married. The mean monthly income of the respondents was 429 birr (table 1)

Table1.Socio - demographic characteristics of municipal solid waste management workers in Gondar town and Bahirdar city, 2012

Variables	Number	%
Sex		
Female	379	78.6
Male	103	21.4
Total	482	100
Age group		
< 30	232	48.1
≥30	250	51.9
Religion		
Orthodox	443	91.9
Protestant	6	1.2
Muslim	33	6.8
Educational status		
Illiterate	285	59.1
Primary	159	33.0
Secondary	38	7.9
Marital status		
Married	165	34.2
Single	180	37.3
Divorced	91	18.9
Widowed	46	9.5
Monthly income in birr		
<200	21	4.4
200 – 600	441	91.5
>600	20	4.1

5.2. Characteristics of work related injuries

5.2.1. Occurrence of injury in the last twelve months

Out of 482 municipal solid waste management workers who had direct waste contact, 308 of the respondents were injured in the last twelve months. Therefore, the overall prevalence of work related injury was 63.9 per 100 exposed workers per year. Of the 308 workers who were injured in the last one year, 216(70.1%) workers experienced work related injury more than once. Moreover, 36 (11.70%) workers had injury in the last one month prior to the data collection. Of the 36 cases, 5(13.9%) reported that they had been injured more than once in one month(table 2).

Table2: Distribution of work-related injury in the last 12 months among municipal solid waste management workers in Gondar town and Bahirdar city, 2012.

Variables	Number	%
Work related injury in the last 12 months		
No	174	36.1
yes	308	63.9
Frequency of occurrence in the last 12 months		
Once	92	29.9
More than once	216	70.1
Work related injury in the last one month		
Yes	36	11.7
No	272	88.3
Frequency of occurrence in the last one month		
Once	31	86.1
More than once	5	13.9

5.2.2. Injury by type

The leading type of injury reported by the workers was cut / punctures 119(38.6%). However, because of the nature of the job, higher numbers of workers were affected by a combination of two or more injuries. Eighty four (27.3%) workers were affected by two or more injuries.

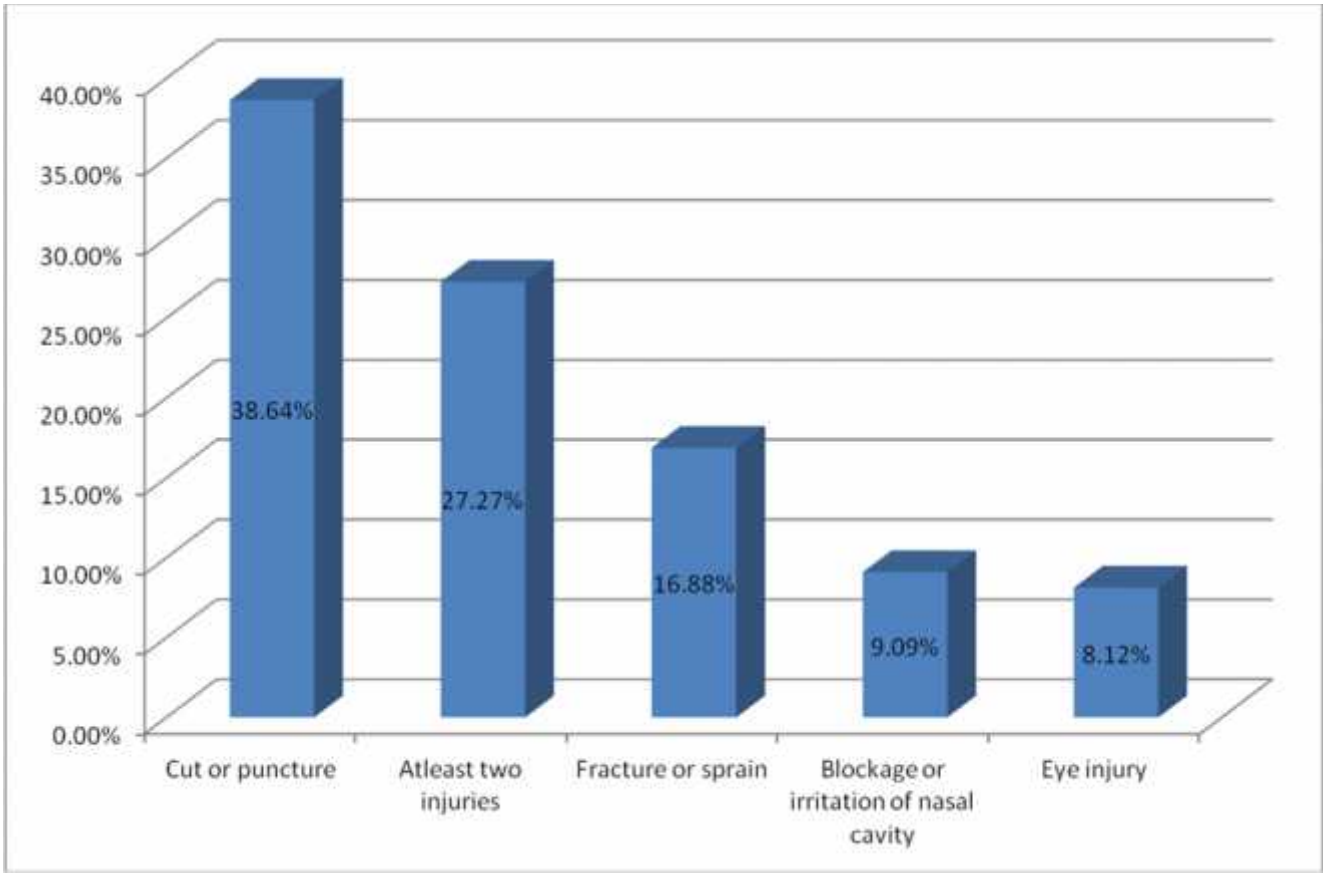


Figure2: Most common types of injury among municipal solid waste management workers in Gondar town and Bahirdar city, 2012.

5.2.3. Body parts affected

The highest number of workers 70(22.7%) were injured on their hand followed by leg 67(21.8%) injury.

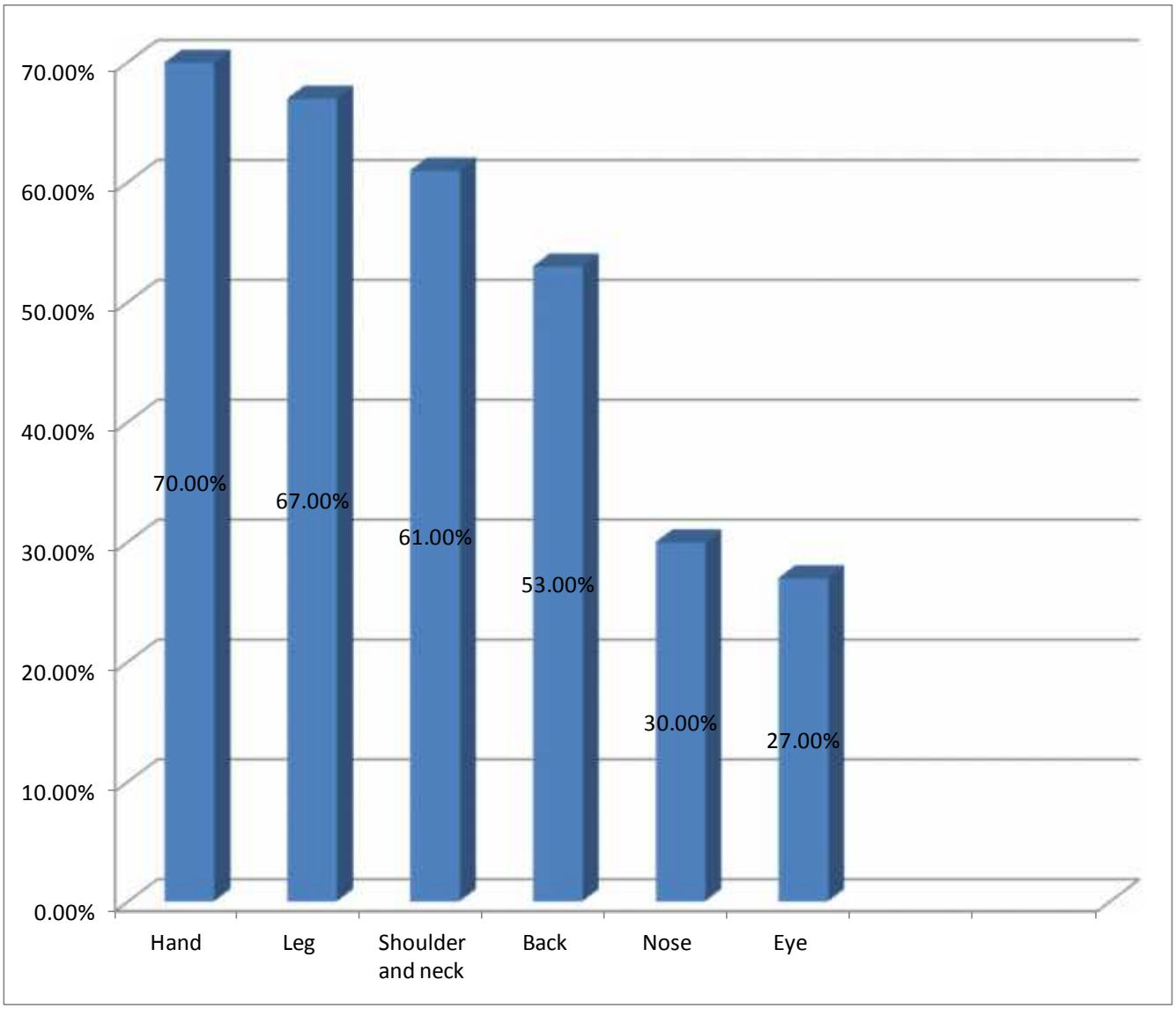


Figure3: Part of body affected by different types of injury among municipal solid waste management workers in Gondar town and Bahirdar city, 2012.

From workers who had hand injury, 35(50%) workers reported injury on two or more hand parts (Table 3).

Table3: Distribution of work related injury on different body parts among municipal solid waste management workers in Gondar town and Bahirdar city, 2012.

Variables	Number	Percent
Parts of hand injured		
Elbow	8	11.4
Finger	21	30.0
Upper arm	5	7.1
Lower arm	1	1.4
At least two hand parts	35	50.0
Total	70	100.0
Parts of leg injured		
Knee	12	18.0
Toe/feet	19	28.0
Upper leg	6	9.0
Lower leg	1	2.0
At least two leg parts	29	43.0
Total	67	100.0
Parts upper neck injured		
Eye	14	24.6
Nose	23	40.4
Eye and nose	20	35.0
Total	57	100.0

5.2.4. **Cause or mechanism of injury**

In this study, the causes for work related injury were highly variable, but the most common agent stated as causes were sharp or slender pointed objects by 73(23.7%), lifting/pushing/puling of heavy waste storage containers by 37(12%), dust or particulate matters by 32(10.4%). Eighty five (27.6%) of injuries were caused by two or more causes (Figure 4).

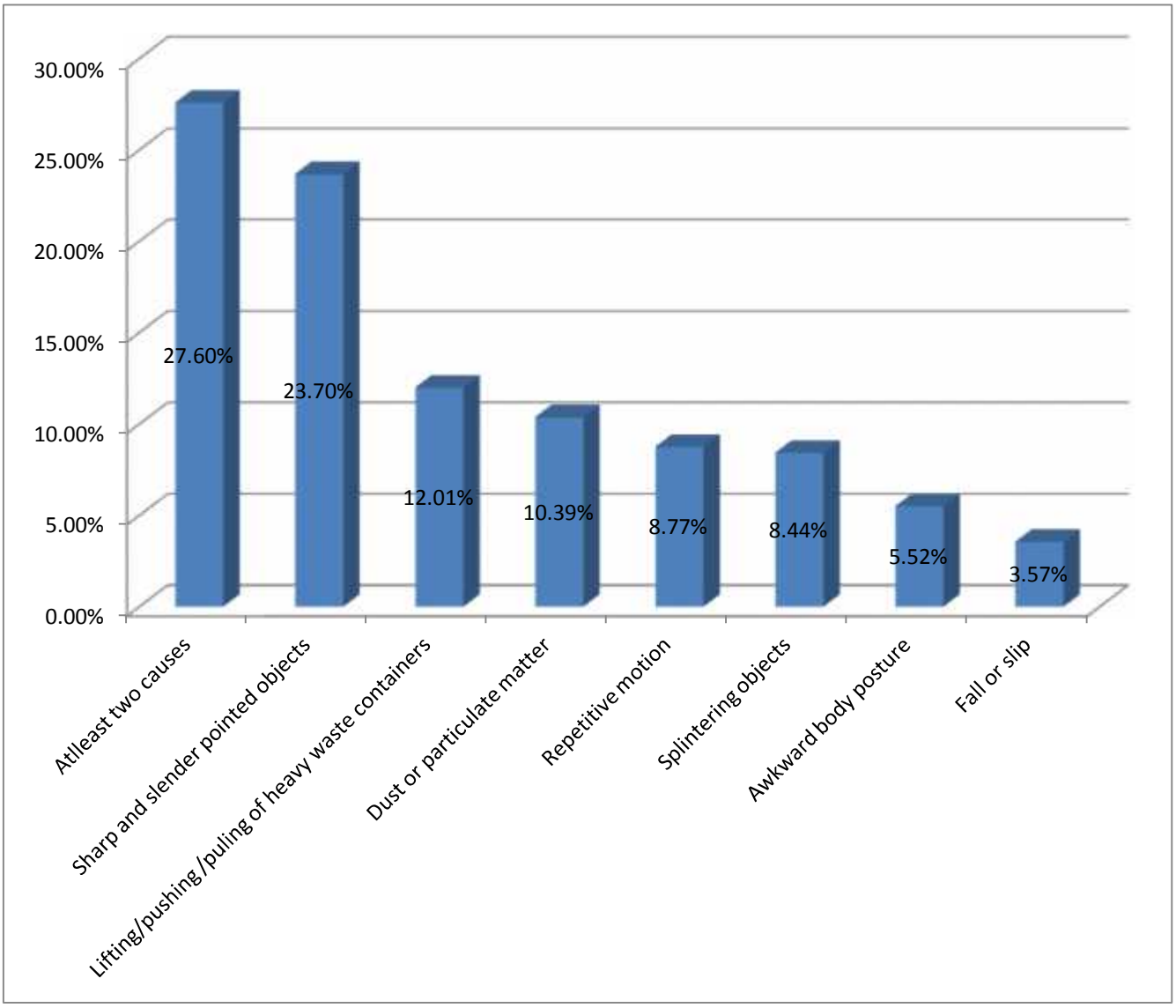


Figure4: Common causes or mechanisms of injury among municipal solid waste management workers in Gondar town and Bahirdar city, 2012.

5.2.5. Season and time of injury occurrence

Regarding the occurrence of injury, 155(50.3%) of the total reported injuries occurred during summer, where as 71(23%) and 82(26.7%) were during winter and both summer and winter respectively. Also 155(50.3%), 98(31.8%) and 55(17.9%) injuries were reported during morning or early morning, noon and both morning and noon respectively.

5.2.6. Severity of injury

Of the 308 municipal solid waste management workers who had injury in the last twelve months, 110(35.7%) workers were lost from 1 – 3 working days due to injury. Similarly, 77(25%) workers lost more than three working days.

5.3. Work environment and behavioral characteristics of respondents.

The work environment and behavioral characteristics of respondents are summarized by tables below.

Table 4: Work environment and behavioral characteristics of municipal solid waste management workers in Gondar town and Bahirdar city, 2012.

Work env't and behavioral characteristics	Number	Percent
Job category		
Only one job	147	30.5
Two or more jobs	335	69.5
Total	482	100.0
Days worked per week		
≤ 5 days/40 hours/	82	17.0
>5 days/48 hours/	400	83.0
Total	482	100.0
Service year		
≤3 years	277	57.5
>3 years	205	42.5
Total	482	100.0
Health and safety training		
Yes	132	27.4
No	350	72.6
Total	482	100.0
Use of PPEs		
No	180	37.3
Yes	302	62.7
Total	482	100.0

Table 4: continued ….

Work env't and behavioral characteristics	Number	Percent
Sleeping pattern		
Normal or sleepy	179	37.1
Non sleepy with nonrestortive sleep	195	40.5
Insomnia	108	22.4
Total	482	100.0
Level of drink		
No drink	418	86.7
heavy drink	64	13.3
Total	482	100.0

5.4. Work related injury determinants

Table 5: Distribution of municipal solid waste management workers in different job categories in Gondar town and Bahirdar city, 2012.

Job category	Accident of injury in the last twelve months		Total
	No	Yes	
Street sweeper	44(55.7%)	35(44.3%)	79(100%)
Loader – off loader	7(46.7%)	8(53.3%)	15(100%)
Waste picker	21(35.6%)	38(64.4%)	59(100%)
House to house waste collector and street sweeper	31(29.0%)	76(71.0%)	107(100%)
House to house waste collector, street sweeper and loader - off loader	8(21.1%)	30(78.9%)	38(100%)
Loader – off loader and waste picker	3(27.3%)	8(72.7%)	11(100%)
House to house waste collector and loader – off loader	60(34.7%)	113(65.3%)	173(100%)
Total	174(36.1%)	308(63.9%)	482(100%)

5.4.1. Bi-variate and multi-variate analysis of work related determinants

In Bi-variate binary logistic regression analysis work related injury was associated significantly with age, educational status, marital status (widowed), job category, service year, health and safety training, utilization of PPEs, sleeping pattern and alcohol consumption (see table 6).

However, in the multi-variate binary logistic regression analysis, injury was associated significantly with age; educational status, job category, service year, health and safety training, utilization of PPEs, sleeping pattern and alcohol consumption (see table7).

Table6: Bi-variate logistic regression of work related injury with predictor variables among municipal solid waste management workers in Gondar town and Bahirdar city, 2012.

Predictor variables	Injury in the last 12 months		Crude odds ratio	95% C.I of the crude odds ratio	
	Yes	No		Lower	Upper
Sex					
Female	237	142	1		
male	71	32	1.329	0.834	2.119
Age					
<30	122	110	1		
≥30	186	64	2.620	1.786	3.845 *
Educational status					
Illiterate	225	60	1		
Primary	74	85	0.232	0.152	o.354 *
Secondary	9	29	0.083	0.037	0.184 *
Marital status					
Married	104	61	1		
Single	100	80	0.733	0.476	1.129
Divorced	66	25	1.548	0.886	2.706
Widowed	38	8	2.786	1.221	6.360 *
Job category					
One job only	81	66	1		
At least two jobs	227	108	1.713	1.151	2.549 *
Service year					
≤ 3 years	134	143	1		
>3 years	174	31	5.990	3.823	9.384 *

Table 6: continued…

Monthly income in birr					
<200	15	6	1		
200 – 600	277	164	0.676	0.257	1.776
>600	16	4	1.600	0.376	6.808
Days /Hours worked per week					
≤ 5 days/40 hours	48	34	1		
>5 days/40 hours	260	140	1.315	0.810	2.137
Health and safety training					
Yes	57	75	1		
No	251	99	0.300	0.198	0.454 *
Utilization of PPEs					
No	154	26	1		
Yes	154	148	0.176	0.109	0.282 *
Sleeping pattern					
Normal	58	121	1		
Non sleepy with nonrestortive sleep	147	48	6.389	4.066	10.038 *
Insomnia	103	5	42.976	16.611	111.186 *
Alcohol consumption					
No drink	249	169	1		
Heavy drink	59	5	8.009	3.149	20.371 *

* Significance variables (95% C.I does not include 1)

Table7: Multi-variate logistic regression of work related injury with predictor variables among municipal solid waste management workers in Gondar town and Bahirdar city, 2012.

Predictor variables	Injury in the last 12 months		Crude odds ratio	95% C.I of the crude odds ratio		Adjusted odds ratio	95% C.I of the adjusted AOR	
	Yes	No		Lower	Upper		Lower	Upper
Age in years								
<30	122	110	1					
≥30	186	64	2.620	1.786	3.845	1.834	1.003	3.355*
Educational status								
Illiterate	225	60	1					
Primary	74	85	0.232	0.152	o.354	0.249	0.135	0.460*
Secondary	9	29	0.083	0.037	0.184	0.086	0.029	0.252*
Job category								
One job only	81	66	1					
At least two jobs	227	108	1.713	1.151	2.549	3.538	1.861	6.725*
Service year								
≤ 3 years	134	143	1					
>3 years	174	31	5.990	3.823	9.384	5.758	2.824	11.739*
Health and safety training								
Yes	57	75	1					
No	251	99	0.300	0.198	0.454	2.569	1.284	5.137*
Utilization of PPEs								
No	154	26	1					
Yes	154	148	0.176	0.109	0.282	0.164	0.082	0.326*

Table 7: continued…

Sleeping pattern								
Normal	58	121	1					
Non sleepy with nonrestortive sleep	147	48	6.389	4.066	10.038	3.987	2.192	7.249*
Insomnia	103	5	42.976	16.611	111.186	27.376	9.108	82.288*
Alcohol consumption								
No drink	249	169	1					
Heavy drink	59	5	8.009	3.149	20.371	3.632	1.162	11.356*

* Significance variables (95% C.I does not include 1)

5.5. Significant variables by the model

5.5.1. Socio demographic determinants

Age and educational status were the significant socio demographic determinants of work related injury. The older workers were more injured than youngers. Workers aged ≥30 years were 1.834 times more likely to be injured than workers aged < 30 years (AOR = 1.834, 95% C.I = 1.003 – 3.355).

The prevalence of work related injury was decreased as level of education increased. Work related injury decreased by 75.1% among workers who completed grade 8(AOR = 0.249, 95% C.I = 0.135 – 0.460).Injury also decreased by 91.4% among workers who completed grade 9 – 12 compared to the illiterate one [AOR = 0.086, 95% C.I = 0.029 – 0.252]

5.5.2. WORK ENVIRONMENT DETERMINANTS

Job category, service year, health and safety training and utilization of PPEs were the major work environment determinants of injury.

Service year had significant association with prevalence of work-related injury. Workers who reported higher working year (above 3 years) were more likely to report work related injury than their counterparts (AOR=5.758, 95% C.I=2.824 – 11.739).

Job category was also statistically associated with work related injury. Workers who had at least two job categories were 3.538 times more likely to be injured than workers who had one category (AOR = 3.538, 95% C.I = 1.861 – 6.725).

Those workers who had not health and safety training were more likely to report work related injury than trained one [AOR = 2.569, 95% C.I =1.284 – 5.137].

Utilization of PPEs had preventive role on work related injury. The probability of injury occurrence was decreased by 83.6% among users than non users [AOR = 0.164, 95% C.I =0.082 – 0.326].

5.5.3. BEHAVIOURAL DETERMINANTS

This study revealed that sleeping pattern and alcohol consumption were statistically associated with work related injury. The odds of having work related injury among non sleepy with nonrestortive sleep individuals was 3.987 times higher than sleepy individuals [AOR =3.987, 95% C.I = 2.192 – 7.249].Insomnia individuals were also 27.376 times more likely to be injured than sleepy individuals (AOR = 27.376, 95% C.I = 9.108 – 82.288).But the confidence interval is wide. It may be due to small number of participants in the category and accuracy of the measurement in a survey.

Heavy drinkers were 3.632 times more likely to be injured than non drinkers (AOR = 3.632, 95% C.I = 1.162 – 11.356).

6. DISCUSSION

This study was done to assess the prevalence of work related injury and associated factors in the last twelve months among municipal solid waste management workers in Gondar town and Bahirdar city. The severity and types of injury were also assessed.

In this study, the overall annual prevalence rate of work related injury was 63.9 %.The one month commutative incidence, on another hand, was 11.7%. This figure is markedly greater than rate reported by other studies. A study conducted in Brazil among rag pickers during 2012 reported that 20% of the rage pickers were injured (21). Other study conducted in Zimbabwe during 2006 and Brazil during 2008 reported that 41% and 38%prevalence rate of one or more work related injuries respectively(20). The highest prevalence rate in the study area may be justified as: no suitable and complete protective equipments given; their protective equipment could not serve to the intended purpose because they were not of good quality and most workers were not using them at work always; it was rare to find workers in their complete outfit at work contrary to the ideal situation; the type of waste and management systems.

This study has depicted that hands 22.7%, legs 21.8%, shoulder /neck 19.8% and back 17.2% as the most commonly injured area of the body. Similar study conducted in Australia among refuse collectors had depicted that hands 9%, legs 20%, back 25%, shoulder/ neck 21%(1, 21, 50) The discrepancy between hand, shoulder and back injury is due to the capacity of bins. In Australia, they used litter bins located in parks and gardens which are more difficult to work with and required higher forces to push or pull a full wheel bin across soft or wet lawn, pine bark, mud or soil and the workers adopted awkward posture. But in the study area workers used bags which were not puncture proofed.

In this study, the most frequent causes of work related injury were sharp and slender pointed objects(23.7%), lifting/pushing/puling of heavy waste storage containers (12%), dust or particulate matters (10.4%), repetitive motion (8.77%), awkward body posture (5.52 %) and fall (3.57%). A study conducted in America during 2010 in solid waste industry showed that lifting/pushing/pushing (22.5%) was the most common

cause of injury followed by fall (10.5%), repetitive motion(6.2%) and awkward body posture (6.2%)(1). A study conducted in Brazil also identified similar causes with different figures (50). The possible reasons in which sharps and slender pointed objects were the common cause of injury for this study population are : No suitable and complete (Gloves, Toetector, reinforced cloth) protective equipments used; Sharps and slender pointed objects were disposed together with the general waste (mixed waste); Even, workers that used hand gloves at the time of data collection were of poor quality; No continuous and frequent use of the PPEs;The community used bag which is not puncture proved to store wastes so that the collectors became easily injured during handling.

Larger number of work related injury occurred during summer [155(50.3%)] than winter [71(23%)] and morning or early morning [155(50.3%)] than the afternoon [98(31.8%)].This may be due to: the waste during summer may became bulky because of wet and rain (wet weight); Clothing suitable to each weather condition was not given to the workers so that accidents like fall. slip are very common; The weather condition also made the workers inactive; Flood out of the sewer line put the waste on the street so that create work burden; Poor illumination for street sweepers and garbage collectors at early morning; The highest number of workers had sleeping disorder so that the next day activity was highly affected and workers became depressed at the morning.

In this study , participants were categorized into two groups according to accident rates: 266 (55.19%) in to the low accident group (0–1 accident per year) and 216 (44.81%) in the high accident group (more than one accidents per year(51).The severity of injury was also assessed by days lost due to injury: 110(35.7%) workers had Non- serious accident which requires 1- 3 days' absence from work and 77(25%) workers had serious accident which requires more than 3 days' absence from work(51).In addition 36(11.7%) workers were current injured(who had injury in the last one month).Of these 31(86.1%) and 5(13.9%) were in the low and high accident group respectively.

This study showed that the prevalence of work related injury increased with old age (≥ 30 yrs). A higher risk was found in study subjects aged ≥ 30 years (AOR = 1.834, 95% C.I = 1.003 – 3.355).Similar study conducted in Kentucky USA during 2011 to assess injury among solid waste collectors in public sectors reported that 35 – 44 years old group in the public Sectors had the highest frequency of work related injury (35-39).Other study conducted in Amsterdam, Nezerland reported that older age workers are subjected to fall injury than the younger(39).This may be due to :The older workers worked equal time with the youngers; There was no chance to do work that is well suited to their ability; The older workers are subjected to some accidents like fall and chronic health effects.

This study also analyzed that increasing educational levels have been associated with decreased work related injuries (AOR = 0.249, 95% C.I = 0.135 – 0.460) and [AOR = 0.086, 95% C.I = 0.029 – 0.252] for primary and secondary education respectively. Most occupational health and safety studies conducted in developing countries revealed that increasing educational levels have been associated with decreasing work related injuries. This may be explained that education is likely to enhance workers health and safety practice, education can increase aware of the potential hazards and the health impacts related to wastes collecting methods and educated workers used the personal protective equipment frequently at work that prevent them from work related injuries(40-41).

Workers having two or more Job categories had higher frequency of work related injury than having one job category with AOR = 3.538, 95% C.I = 1.861 – 6.725. This finding was supported by other similar studies (43-44). This may be due to workers had exposed with different mixed waste items, were subjected to work burden and restless work and workers did not use suitable and complete (Gloves, Toetector, reinforced cloth and respirator) protective equipments for each job category.

The present study showed that Workers who reported higher working year (>3 years) were more likely to report work related injury than their counterparts (AOR=5.758, 95% C.I=2.824 – 11.739).Findings of similar studies strengthen this finding (37, 45-46).This

may be explained that Fatal accidents usually occur to workers who could still have had a long working career ahead of them; the routine type of daily work may not require special experience or expertise and those engaged in such routine activities for long period of time with poor working environment may sustain job dissatisfaction ; the work is insecure so that workers stayed for long period of time in this insecure job had increased vulnerability of different injuries; once the employer provided personal protective equipments ,they did not provide extra for a year and the past injury might be the cause for the next year injury/chronic effect/.

The occurrence of work related injury was also associated with health and safety training. Those workers who had not health and safety training were more likely to report work related injury than trained one [AOR = 2.569, 95% C.I =1.284 – 5.137]. Because of lack of health and safety training towards danger of their occupation, 30 % of workers did not use the personal protective equipment frequently at work. This may be due to: Un-trained workers were not aware of the cause of injuries and their reduction and prevention methods, Un-trained workers did not use the personal protective equipment frequently and correctly at work.

Utilization of PPEs had preventive role on work related injury. The probability of injury occurrence was decreased by 83.6% among users than non users [AOR = 0.164, 95% C.I =0.082 – 0.326].

The result of the study has revealed that the occurrence of work-related injury is significantly related to sleeping disorder. Non sleepy with nonrestortive sleep individuals had 3.987 times higher injury than sleepy individuals. Insomnia individuals were also 27.376 times more likely to be injured than sleepy individuals (AOR = 3.987, 95% C.I = 2.192 – 7.249) and (AOR = 27.376, 95% C.I = 9.108 – 82.288) respectively. This could explain that sleeping disorders affect the ability to maintain wakefulness, concentration, ability in assessing or watching the work environment and working conditions. Most occupational health and safety studies conducted in developing and developed countries strongly agree with this report(47-48). For insomnia individuals the confidence

interval is wide. It may be due to small number of participants in the category and accuracy of the measurement in a survey.

Alcohol consumption was also another statistically associated variable with work related injury. Consistent with other study (42), this study stated that heavy drinkers were more likely to be injured than non drinkers (AOR = 3.632, 95% C.I = 1.162 – 11.356).This may be explained as: alcohol can impaired judgmental and psychomotor skills, alcohol took before work begins cause spillover effects, such as fatigue and hangovers, alcohol may be more likely to be engaged in other behaviors that increase the risk of injury.

7. Strengths and limitations of the study

A. Strength

1. Data were collected from the whole municipal solid waste management workers in Gondar town and Bahirdar city to increase the power of the study (population based study).
2. Internationally accepted or validated measurement tools were used to assess sleeping pattern, job satisfaction and alcohol consumption of the workers.

B. Limitations

1. The study was a one -year cross sectional study. So that it did not identify the cause and effect relation sheep between the dependent variable and determinants.
2. There could be possibility of recall bias and social desirability bias resulting in under or over reporting and misreporting of events.

8. CONCLUSSION

Compared to other similar studies conducted in developed and developing countries, higher prevalence rate of work related injury (63.9%) was reported in the study areas. Significant number, 77(25%) of serious injuries were also reported in the study areas. The commonest causes of injury were sharp and slender pointed objects, lifting/pushing/puling of heavy waste storage containers, dust or particulate matters, awkward body posture, repetitive motion and fall.

Factors related to injury were age of the waste collector, job types, service year, the educational level, provision of health and safety training, utilization of PPEs, sleeping pattern and alcohol consumption. However, some factors proved to be more significant and more influential than others. Consistent with other studies, workers who were old, had long service year, had at least two job category, and sleeping disorder had significantly higher risks of Work-related injury.

9. RECOMMENDATION

Based on the above findings and conclusions for sustained prevention and control of work related injuries, the following recommendations are made for action:

I. For employer

1. Provide waste collectors with suitable and complete protective equipments, such as gloves, face masks, overalls, and rubber boots.
2. Change the refuse collection containers *from bags and bins to two - or four - wheeled containers.*
3. Provide training programs at the onset of hiring, and on an ongoing basis to educate all waste collectors about hazards, injuries, and their reduction and prevention.
4. Development and establishment of registration systems of occupational accidents, diseases and exposures if possible.
5. Develop and administer work shift.

II. For Waste collectors

1. Ensure that wastes collected to be lifted manually are as light as possible.
2. Encourage team lifting techniques to improve lifting of heavy items and decrease over lifting of wastes.
3. Always use the available personal protective equipments.
4. Cooperate with the employer to prevent work-related injuries to self and others.
5. Notify the employer of a workplace injury as soon as possible after the injury happens.

III. For other researchers

1. Extend the study on different health problems other than injury.

IV. For local labor organization

1. Identify and coordinate rehabilitation strategies that ensure the worker is able to safely perform their duties.
2. Ensure whether health and safety rights of waste collectors are preserved or not at the work environment.
3. Enforce the employers to provide complete and suitable PPEs of good quality.

10. References

1. Olorunnishola TA, BYRD L. Occupational injuries and illnesses in solid waste industry. a call for action. journal of Morgan State University School of Community Health and Policy. 2010; 20(2):211-23.
2. Zangirolani L, Cordeiro R, Stephan C. Spatial distribution of risks for work related injuries in a city of Southeasterne Brazil. university of Campinas ,Department of Preventive and Social Medicine. 2007.
3. Lund F, Marriott A. Occupational Health and Safety and the PoorestApril 2011 Contract No. 88.
4. Piedrahita H. Costs of Work Related Musculoskeletal Disorders (MSDs) in Developing Countries;Colombia Case, Department of Human Work Sciences. Lulea University of Technology. International Journal of Occupational Safety and Ergonomics (JOSE) 2006;12 No 4 379–86.
5. Du J, Leigh JP. Incidence of Workers Compensation Indemnity Claims Across Socio Demographic and Job Characteristics American journal of industrial medicine. 2011;54:758–70.
6. Jovanoviæ J, Aranðeloviæ M, Jovanoviæ M. MULTIDISCIPLINAR ASPECTS OF OCCUPATIONAL ACCIDENTS AND INJURIES. ournal of University of Nis, Series: Working and Living Environmental Protection. 2004;Vol. 2, No 4 pp. 325 – 33.
7. Gyekye S. Workers' Perceptions of Workplace Safety:An African Perspective. Department of Social Psychology. University of Helsinki. Finland International Journal of Occupational Safety and Ergonomics (JOSE) 2006;12 No 1:31–42.
8. Wilkins K, Mackenzie S. Work injuries Health Reports August 2007 Statistics;vol. 18, No. 3.
9. Niu S. Ergonomics and occupational safety and health. An ILO perspective. journal of Applied Ergonomics 2010;vol.41 ,744e753.
10. Takala J, Urrutia M, Hämäläinen P, Saarela KL. The global and European work environment numbers, trends, and strategies. SJWEH Suppl. 2009;vol. 7:15–23.
11. Ha¨ma¨la¨inen Pi, Takala J, Saarela KL. Global estimates of occupational accidents. Safety Science 2006;vol.44:137–56.

12. DanF, eHow. Top Ten Dangerous Jobs in the U.S. [cited 2012 February 10 at 0520 pm,226]; available at www.ehow.com .Job Search & Employment].

13. Rushton L. Health hazards and waste management. British Medical Bulletin. 2003.

14. Mardi N. READY RECKONER ON MUNICIPAL SOLID WASTE MANAGEMENT FOR URBAN LOCAL BODIES. Chennai
November 2008;vol.5.

15. Pandey R. Solid Waste Management Practice and Health Implicatio.
A Case of Kathmandu Metropolitan City, Nepal The Himalayan Review 2004-2005;vol.35-36:33-47.

16. Henry RK, Yongsheng Z, Jun D. Municipal solid waste management challenges in developing countries. Kenyan case study waste management. 2006;vol.26:92–100.

17. UNEP. Engaging Governments an Industry in Demonstrating 3R Principles through Integrated Waste Management. (UNEP) 2006-2009.

18. Cointreau S. Occupational and Environmental Health Issues of Solid Waste Management Special Emphasis on Middle- and Lower-Income Countries: The International Bank for Reconstruction and Development/The World Bank2006.

19. Kuijer P, Dresen M. World at work: Refuse collectors. 2002.

20. Kuijer PPF SJ, Frings-Dresen MH. . Health and Safety in Waste Collection: Towards Evidence-Based Worker Health Surveillance. AMERICAN JOURNAL OF INDUSTRIAL MEDICINE 2010;vol.53:1040–64.

21. Statstics. ABfL. Industry and Illness Data, Summary Table, 2006 2006 [cited 2012 February 10 at 0520 pm.]; available at www.bls.gov/iif/oshum.htm].

22. Safe work Australia.work related injuries in Australia 2005-2006 ,factors affecting application for workers' compensation. Augest,2009.

23. Olorunnishola, TAYLOR AK, BYRD L. Occupational injuries and illnesses in solid waste industry. a call for action. journal of Morgan State University School of Community Health and Policy. 2010;20(2):211-23.

24. Zangirolani LTO, Cordeiro R, Stephan C. Spatial distribution of risks for work related injuries in a city of Southeasterne Brazil. university of Campinas ,Department of Preventive and Social Medicine. 2007.

25. Safe work Australia.work related injuries in Australia 2005-2006 ,factors affecting application for workers' compensation. Augest,2009.

26. TJayakrishnan, Jeeja M. Unmet needs of solid waste management workers at Calicut Corporation area. In: As part of Centre of Excellence on Solid and Liquid Waste Management MoUD, editor.: Government of India; 24th, 25th & 26st June 2010

27. INYANG MP. HEALTH AND SAFETY RISKS AMONGST THE MUNICIPAL SOLID WASTE COLLECTORS IN PORT HARCOURT METROPOLIS OF THE NIGER DELTA REGION OF NIGERIA: International Conference "Waste Management, Environmental Geotechnology and Global Sustainable
DevelopmentAugust 28 - 30, 2007.

28. Chan AH, Leung PC. Occupational Safety and Health Problems of Workers in Hong Kong Recycling Industries . A Preliminary Ergonomic Study. Proceeding of international multi conference of engineers and computer scientists 2011;vol II.

29. Window J. Musculoskeletal Disorders of Refuse Collectors emptying litter bins which are housed inside street furniture: University of South Australia
2006.

30. Gyekye SA. Workers' Perceptions of Workplace Safety:An African Perspective. Department of Social Psychology. University of Helsinki, Finland International Journal of Occupational Safety and Ergonomics (JOSE) 2006;12 No. 1:31–42.

31. Askenazy P. Some determinants of reporting workplace accidents in France. The role of labour contract February 2006.

32. Veazie MA, Landen DD, Bender TR, Amandus HE. EPIDEMIOLOGIC RESEARCH ON THE ETIOLOGY OF INJURIES AT WORK. Division of Safety Research, National Institute for Occupational Safety and Health, Morgantown, West Virginia.

33. Lundstrom T, Pugliese G, Bartley J, Cox J. Organizational and environmental factors that affect worker health and safety and patient outcomes.university of Detroit, Michigan.

34. Bello SR, Mijinyawa Y. Assessment of injuries in small scale sawmill industry of south western Nigeria Agric Eng Int: CIGR Journal March, 2010;VOL.12, No.1 151

35. Kisner S, Pratt S. Occupational fatalities among older workers in the United States: . J Occup Environ Med 2005;39:715–21.

36. Terry LB, Slavova S, Tang M. Injuries among solid waste collectors in the private versus public sectors. Waste Management & Research
July 2011;29(10) 1043–52.

37. Yiha O, Kumie A. Assessment of occupational injuries in Tendaho Agricultural Development S.C, Afar Regional State
Ethiop J Health Dev. Augest 2006.

38. Safe Work Australia WORK-RELATED TRAUMATIC INJURY FATALITIES, AUSTRALIA 2009–10March 2012.

39. VIANDA SS, JOHANNE SHS, M FPS, LIPS P. Consequences of falling in older men and women and risk factors for health service use and functional decline
Age and Ageing 2004;Vol. 33 No. 1.

40. Liv X. Relationship Occupational injuries with social and economic factors.2004 ,22:86-89. 2004.

41. Milhem AKM. Investigation of Occupational Health and Safety Hazards among Domestic Waste Collectors in Bethlehem and Hebron Districts 2004.

42. Wang L, Wheeler K, Bai L, Stallones L, Dong Y, Xiang JGH. Alcohol Consumption and Work-Related Injuries Among Farmers in Heilongjiang Province, People's Republic of China. AMERICAN JOURNAL OF INDUSTRIAL MEDICINE 2010;vol.53:825–35

43. Gauchard GC, Chau N, Touron C, Benamghar L, Dehaene D, Perrin P, et al. Individual characteristics in occupational accidents due to imbalance: a case-control study of the employees of a
railway company Occup Environ Med 2003;60:330–335. 2003.

44. Niu S. Ergonomics and occupational safety and health. An ILO perspective. journal of Applied Ergonomics 2010;vol.41 ,744e753.

45. International Labour Organization ;Safety in numbers Pointers for global safety culture at work.

46. C JaO, Linda K, Luisa CM, Neboj aN, Heikki S. Self-reported injuries among seafarers Questionnaire validity and results from an international study

Accident Analysis and Prevention 36 (2004) 405413. 2004.

47. NAKATA A, IKEDA T, TAKAHASHI M, HARATANI T, FUJIOKA Y, FUKUI S. Sleep-related Risk of Occupational Injuries in Japanese Small and Medium-scale Enterprises. Industrial Health 2005, 43, 89–97.

48. Melamed S, Oksenberg A. Excessive Daytime Sleepiness and Risk of Occupational Injuries in Non-Shift Daytime Workers DAYTIME SLEEPINESS SLEEP, Vol. 25, No. 3, 2002.

49. Bahir Dar City .Solid Waste Characterization and Quantification of Bahir Dar City 2010 report.

50. Lund F MA. Occupational Health and Safety and the PoorestApril 2011 Contract No.: 88.

51. SAG. Workers' Perceptions of Workplace Safety:An African Perspective. Department of Social Psychology. University of Helsinki. Finland International Journal of Occupational Safety and Ergonomics (JOSE) 2006;12 No 1:31–42.

52. Bogan RK, Turner JA. New assessment tools that measure sleep vital signs. the SleepMed Insomnia Index and the Sleep Matrix, Neuropsychiatric Disease and Treatment. 2007;vol.3(4) 501–10

53. Ololube NP. Teachers Job Satisfaction and Motivation for School Effectiveness: An Assessment.University of Helsinki Finland.

54. Worrell TG. School Psychologists' Job Satisfaction: Ten Years Later.Virginia: Virginia Polytechnic Institute and State University; May, 2004.

55. weiss DJ, Dawis RV, england GW, Lofquist LH. Minnesota studies in vocational rehabilitation:xxii.Manual for Minnesota satisfaction questionnaire. vocational rehabilitation adiministration,department of health ,education and walefare,washington.

56. Standard drink [cited 2012 February 22 at 05:30pm]; available at www.alcoholanswers.org/alcohol.../alcohol-related-questions.cfm].

11. ANNEXES

Annex I: Information Sheet and Consent Form

Information Sheet and Consent Form Prepared for solid waste collectors who are going to participate in the research project, assessment of occupational related injuries associated with solid waste management and risk factors among waste collectors in Gondar town.

Title of the Research Project:

Assessment of occupational injury and associated factors among municipal solid waste workers in Gondar town and bahirdar city**, 2012**

Name of Investigator; Zemichael gizaw

Name of the Organization: University of Gondar College of Medicine and Health Sciences, institute of Public Health.

Name of the Sponsor: University of Gondar

Introduction:

This information sheet and consent form is prepared to explain the study you are being asked to join. Please listen carefully and ask any questions about the study before you agree to join. You may ask questions at any time after joining the study. This research team includes one principal investigator, eight data collectors, two supervisors and two advisors from University of Gondar.

Purpose of Research Project

The purpose of this research is to assess occupational related injuries associated with solid waste management and risk factors among waste collectors in Gondar town. The study will be helpful in determining the current prevalence of occupational related injuries associated with solid waste management and risk factors among waste collectors and contributes much to design appropriate intervention strategies. It also will serve as baseline information for subsequent studies in the country.

Procedure

To assess occupational related injuries associated with solid waste management and risk factors among waste collectors, we invite you to take part in this project. If you are willing to participate in this project, you need to understand and sign the agreement form. Then after, you will be interviewed by the data collector to give your response. You do not need to tell your name to the data collector and all your responses and the results obtained will be kept confidentially by using coding system whereby no one will have access to your response.

Risk/ Discomfort

By participating in this research project, you may feel that it has some discomfort especially on wasting your time about 25 - 35 minutes. We hope you will participate in the study for the sake of the benefit of the research result. There is no risk in participating in this research project.

Benefits

If you participate in this research project, there may not be direct benefit to you but your participation is likely to help us in assessing occupational related injuries associated with solid waste management and risk factors among waste collectors. Ultimately, this will help us to work on intervention strategies.

Incentives/Payments for Participating

You will not be provided any incentives or payment to take part in this project.

Confidentiality

The information collected from you will be kept confidential and will be stored in a file, without your name, but a code number assigned to it. And it will not be revealed to anyone except the principal investigator and will be kept locked with key.

Right to refuse or withdraw

You have full right to refuse from participating in this research. You can choose not to respond to some or all questions if you do not want to give your response. You have

also the full right to withdraw from this study at any time you wish, without losing any of your right.

Person to contact: This research project will be reviewed and approved by the ethical clearance committee of university of Gondar research and publication office. If you want to know more information, you can contact the committee through the address below. If you have any question you can contact any of the following individuals (Investigator and Advisors) and you may ask at any time you want.

1. Zemichael gizaw: University of Gondar, College of Medicine and Health Science, institute of public health, Department of Environmental and Occupational health and safety.

   Cell phone: +251913348400

   E-mail: zemichael12@gmail.com

2. Mengesha adimasu (RS, MD, MPH, Professor): University of Gondar, College of Medicine and Health Science, institute of public health, Department of Environmental and Occupational health and safety.
3. Mesafint Molla (RS, BSc, MPH): University of Gondar, College of Medicine and Health Science, institute of public health, Department of Environmental and Occupational health and safety.

   E-mail: mesafintmolla@yahoo.com

Annex II: Amharic version information sheet and consent form

የመረጃ መስጫና ስምምነት መጠየቅያ ቅጽ

በጎንደር ከተማ ውስጥ በሚገኙ የደረቅ ቆሻሻ ሰብሳቢና አስወጋጅ ሰራተኞች ላይ ሊደርስ የሚችለውን ስራ ና ስራ ነክ አደጋዎችን ወይም ጉዳቶችን ***ለማወቅ ለሚደረግ ጥናት የመረጃ መሰጫ ና ስምምነት መግለጫ የተዘጋጀ ቅጽ***

ዋና ተመራማሪ: ዘሚካኤል ግዛው

የተቋሙ ስም: ጎንደር ዩኒቨርሲቲ፣ ህክምናና ጤና ሳይንንስ ኮሌጅ፣ የህብረተሰብ ጤና አጠባበቅ ኢንስቲቲዩት

ወጪውን የሚሸፍነው ተቋም: ጎንደር ዩኒቨርሲ

መግቢያ

ይህ የማብራሪያና የስምምነት ቅጽ አሁን እርስዎ እንዲሳተፉበት የሚንጠይቅዎትን የምርምር ጥናት የሚያብራራ ነዉ:: እባክዎ በዚህ ጥናት ለመሳተፍ ከመወሰንዎ በፊት ይህንን ቅጽ መረጃ ሰብሳቢዎቹ በሚያነቡልዎት ጊዜ በጥንቃቄ በማድመጥ ጥያቄዎች ካለዎት ይጠይቁ:: በዚህ ጥናት መሳተፍ ከጀመሩ በኋላም በማንኛዉም ጊዜ ጥያቄዎች ካሉዎት መጠየቅ ይችላሉ:: ጥናቱ የሚካሄደዉ በአንድ የኤምፒኤች ተመራቂ ተማሪ ና በሁለት የጎንደር ዩኒቨርሲቲ የጥናቱ አማካሪ ነዉ::

የጥናቱ አላማ

የዚህ ጥናት አላማ በጎንደር ከተማ ውስጥ በሚገኙ የደረቅ ቆሻሻ ሰብሳቢና አስወጋጅ ሰራተኞች ላይ ሊደርስ የሚችለውን ስራ ና ስራ ነክ አደጋዎችን ወይም ጉዳቶችን ለማወቅ ነዉ:: ጥናቱ ባሁኑ ጊዜ በደረቅ ቆሻሻ አሰባሰብና አወጋገድ እንድሁም ቁጥጥር ጊዜ ሰራተኞች ላይ ሊደርስ የሚችለውን ስራ ና ስራ ነክ አደጋዎችን ወይም ጉዳቶችን ለማወቅ እንድሁም ችግሩን ለመቅረፍ በሚደረገዉ ሂደት ትልቅ አስተዋጽኦ ያደርጋል:: በተጨማሪም በሀገሪቱ ለሚደረጉ ሌሎች ተከታታይ ጥናቶች እንደ መነሻ መረጃ በመሆን ይጠቅማል::

የአሰራር ሀደት

በጎንደር ከተማ ውስጥ በሚገኙ የደረቅ ቆሻሻ ሰብሳቢና አስወጋጅ ሰራተኞች ላይ ሊደርስ የሚችለውን ስራ ና ስራ ነክ አደጋዎችን ወይም ጉዳቶችን ለማወቅ በተዘጋጀ ፕሮጀክት ላይ እንድሳተፉ ጋብዘንዎታል:: በዚህ ጥናት ዉስጥ ለመሳተፍ ከተስማሙ ስምምነቱን መረዳትና መስማማትዎን መግለጽ ይገባዎታል:: ከዚህ በኋላ መረጃ ሰበሳቢዉ መጠይቁ ላይ ያሉትን ጥያቄች ይጠይቅዎታል :: ስምዎን መናገር አያስፈልግዎትም:: የሚሰጡት መረጃ ምስጥራዊነቱ ይጠበቃል::

አደጋዎች ወይም አለመመቻቸት

በዚህ ጥናት በመሳተፍዎ የተወሰነ ያለመመቻቸት ዎይንም ጥሩ ያልሆነ ስሜት ሊሰማዎት ይችላል፡፡ በተለይ የስራ ጊዜዎትን ከ 25 – 35 ደቂቃ ያህል ይሻማዎታል:: ነገር ግን ጥናቱ ከሚሰጠዉ ጥቅም አኳያ እንደሚሳተፉ ተስፋ አደርጋለሁ::

ጠቀሜታ

በዚህ ጥናትላይ በመሳተፍዎ ቀጥተኛ የሆነ ጥቅም ላያገኙ ይችላሉ፤ ነገር ግን የእርስዎ ተሳትፎ በሰራተኞች ላይ የሚደርሱትን ስራ ና ስራ ነክ አደጋዎችን ዎይም ጉዳቶችን ለማጥናት ይረደናል:: በተጨማሪም ችግሮቹን ለመከላከል በሚደረጉ ስትራቴጂካዊ ርምጃዎች ላይ እንደ መነሻ ያግዘናል::

የተሳትፎ ክፍያዎች /ጥቅሞች/

በጥናቱ በመካፈልዎ የሚሰጡት ክፍያ የለም::

ሚስጥር ስለመጠበቅ

ለዚህ ጥናት የሚሰበሰብ መረጃ በሚስጥር ይጠበቃል:: የሚሰበሰበዉ መጠይቅ የእርስዎ ለመሆኑ መለያ አይኖረዉም:: መረጃዉ በዋናዉ ተመራማሪ ፋይል ተደርጎ በቁልፍ የሚቀመጥ በመሆኑ ሌላ ሰዉ ሊያገኘዉ አይችልም::

በጥናቱ ያለመሳተፍ ወይም ራስን ከጥናቱ የማግለል መብት

በጥናቱ ላለመሳተፍ ከፈለጉ በዚህ ጥናት ያለመሳተፍ ሙሉ መብት አለዎት:: ከመጠየቁ ውስጥ ጥቂት ጥያቄዎችን ወይም በሙሉ ያለመመለስም ይችላሉ::

የሚገናኙዋቸዉ ሰዎች

ስለዚህ ጥናት ጥያቄ ካለዎት የሚከተሉትን ሰዎች ማነጋገር ይችላሉ::

1. አቶ ዘሚካኤል ግዛው
   ስ ቁ: +251913348400
2. ፕሮፌሰር መንገሻ አድማሱ
3. አቶ መሳፍንት ሞላ

Annex III: English version of Questionnaire

University of Gondar, College of medicine and health sciences

Institute of public health

Questionnaire for assessment of occupational related injuries associated with solid waste management and risk factors among municipal solid waste collectors in Gondar town

Questionnaire identification number_____

Verbal consent form before conducting interview

Greeting

Hello, I am_____. I am working in the research team of University of Gondar, institute of public health. I would like to ask you a few questions about occupational related injuries that happened to you in the past 12 months. Your name will not be written in this form and will never be used in connection with any information you tell us. All information given by you will be kept strictly confidential. Your participation is voluntary and you are not obliged to answer any question you do not wish to answer. If you feel discomfort with the interview please fill free to drop it any time you want. But, your willingness to answer all of the questions would be appreciated. Your correct answer to the questions can make the study achieve the goals. Therefore, you are kindly requested to respond genuinely and voluntarily with patience. Do I have your permission to continue?

1. I f yes, continue to the next page

2. If no, skip to the next participant by writing reasons for his/ her refusal

Name and Signature of the data collector who sought the consent_____

Informed consent Certified by

Interviewer:

Code_____ Name_____ signature_____

Date of interview _____Time started _____Time completed_____

Result of interview: 1. Completed 2. Respondent not available 3. Refused 4. Partially completed

Checked by Supervisor: Name _____signature _____ Date_____

Questionnaire identification number_____

(adapted from reference 1, 8, 24, 26, 27,29 30)

No	**Question**	**Possible Response**	**skipping**	**Code**
Section one: Socio demographic information				
101	Sex	1. Male 2. Female		
102	Age	_____years		
103	Religion	1. Orthodox 4. Muslim 2. Catholic 5. Others specify 3. Protestant		
104	Educational status	1. Illiterate 2. Primary education(1 - 8) 3. Secondary(9 - 12)		
105	Marital status	1. Married 4. Widowed		

		2. Single 5. Separated 3. Divorced		
106	Job category	1. House to house waste Collector 2. Street sweeper 3. loader and off loader 4. Waste picker 5. Others(Specify)_____		
107	Service duration in day or month or year	_____		
108	Daily or monthly income in birr	_____		
Section Two: Work related injury characteristics				
201	Have you had an incident at job that resulted in an injury to you in the last 12 Months?	1.Yes 2.No		
202	If yes to Q201 or, how many	1. Once 2. More than once		
203	Have you had an incident at job that resulted in an injury to you in the last four	1.Yes 2.No		

	weeks?			
204	If yes to Q201 or /and 202, how many times?	1. Once 2. More than once		
205	Part of the body Affected	1. Eye 2. Elbow 3. Knee 4. Toe 5. Groin/hip 6. Finger 7. Upper Arm 8. Lower Arm 9. Upper Leg 10. Lower Leg 11. Shoulder 12. neck 13. Back 14. Multi location 15. Nasal cavity 16. Others ,specify----------		
206	Type of injury	1. Abrasion 2. Cut 3. Burn 4. Puncture 5. Fracture 6. Sprains and strains 7. Dislocation 8. Eye injury 9. Amputation 10. Blockage /irritation of nasal cavity 11. Other, specify_____		

musculoskeletal injury

207	Causes/mechanisms of injury	1. Hit by Falling objects 2. Splintering objects 3. Hand tools / equipment 4. Falls 5. Collision with objects 6. Lifting heavy objects 7. Awkward body posture 8. Flying object 9. Pulling/pushing 10. Repetitive motion 11. Slip or trip 12. Trapped/Pinched between surfaces 13. Other, specify_____		
208	Season of injury:	1. Summer 2. Winter 3. both		
209	Time of injury	1. In the morning 2. In the Afternoon 3. both		
210	Number of days lost due to injury at work last one year (in days)	1. 0 – 3 days 2. >3 days		
Section three: Work environment information				
301	Days worked per week	_____		
302	Hours worked per Day	----------		

303	Have you had any Work safety training in Connection with employment?	1.Yes 2.No		
304	Did your employer provide personal protective equipments?	1. Yes 2. No		
305	If yes for Q 304, which PPEs	1. Toetector foot wears 2. Hand gloves 3. Reinforced trousers 4. Helmet 5. Goggles 6. Face shield 7. Overalls 8. respirator		
306	If yes for Q 304,do you always make use of the protective materials at work.	1. yes 2. No		
307	If No for Q 306, What are your reasons for not using personal protective Equipment?	1. Lack of protective equipment. 2. Lack of safety and heath education. 3.Not comfortable to use 4.Decrease work performance 5.Create safety and health hazards 6.protective equipments are of poor quality 7.Other, specify_____		

Section four: Information on workers behavior				
401	Do you drink Alcohol?	1. Yes 2 No		
402	If yes to 401,which type?	1. Beer 2. Wine 3. Tella 4. teji 5. Areki		
403	If yes to 401, how Much per week?	------- bottle (beer and wine) -------- can or tasa (tela) -------- birlie(tegi) --------- shot or melekia (areki or sprite)		
404	Level of drink	1. no drink 2. moderate drink 3. heavy drink		
405	Sleeping pattern(Use sleep med insomnia index questionnaire)	1. Insomnia 2. Non sleepy with non restorative sleep 3. Normal or sleepy		
406	Job satisfaction(Use Minnesota job satisfaction questionnaire)	1. Strongly dissatisfied 2. Dissatisfied 3. Satisfied 4. Strongly satisfied		

That is the end of our questionnaire. Thank you very much for taking time to answer these questions. We appreciate your help.

Annex IV: Amharic version questionnaire

በጎንደር ዩኒቨርሲቲ

ህክምናና ጤና ሳይንስ ኮሌጅ

የህብረተሰብ ጤና አጠባበቅ ኢንስቲቲዩት

ይህ መጠይቅ በጎንደር ከተማ ውስጥ በሚገኙ የደረቅ ቆሻሻ ሰብሳቢና አስወጋጅ ሰራተኞች ላይ ሊደርስ የሚችለውን ስራ ና ስራ ነክ አደጋዎችን ወይም ጉዳቶችን ለማጥናት የተዘጋጀ ነዉ::

የመጠየቅያ ቅጽ መለያ ቁጥር _____

<u>ቃለ መጠይቁ ከመደረጉ በፊት የተሳታፊዎችን ፍቃደኝነት መጠየቂያ ቅጽ</u>

ሰላምታ፣ እንደምን አሉ? እኔ አቶ/ወሮ/ወ/ሪት_____ እባላለሁ :: እዚህ የመጣሁት የደረቅ ቆሻሻ አሰባሰብና አወጋገድ የሚያደርሰውን ጉዳት ለማጥናት ነው፡፡ ይህንን ጥናት የሚያካሄደዉም የጎንደር ዩንቨርሲቲ የህብረተሰብ ጤና አጠባበቅ ኢንስቲቲዩት ቡድን አባል ሆኘ ነው:: ከዚህ በመቀጠል ባለፉት አስራ ሁለት ወራት ውስጥ ደረቅ ቆሻሻን ሲሰበስቡ፣በአይነት ሲለዩ ና ሲያስወግዱ የደረሱብዎትን ጉዳቶች በተመለከተ የተወሰኑ ጥያቄዎችን ልጠይቅዎት እወዳለሁ:: ከእርስዎ የምናገኛቸዉን ማንኛቸዉንም መልስ በሚስጥር እንጠብቃለን:: ከዚህ ጥናት ጋር በተያያዘ በማንኛዉም ቦታና ዚዜ ስምዎ እንዳይጻፍና እንደማይጠቀስ ልንገልጽልዎ እንወዳለን:: በጥናቱ የምናሳትፍዎት የእርስዎን ሙሉ ፈቃደኝነት ስናገኝ ብቻ ነው:: በመጠይቁ ሂደት ለመመለስ የማይፈልጓቸዉን ጥያቄዎች ያለመመለስ መብትዎ የተጠበቀ ነዉ:: ይሁን እንጂ የእርስዎ ትብብርና ትክክለኛ ምላሽ ጥናቱና ምርምሩ እንዲሳካ ያደርገዋል:: ስለዚህ ለሚቀርብልዎት ጥያቄ ትክክለኛና ፈቃደኛ ሆነው በትእግስት እንድ መልሱልን እንጠይቃለን::

በጥናቱ ለመሳተፍ ፍቃደኛ ነዎት?

1. አዎ_____ ወደሚቀጥለዉ ይሻገሩ
2. የለም_____ ፍቃደኛ ያልሆኑበትን ምክንያቶች በመጻፍ ወደ ሌላ ተጠያቂ ይሻገሩ::

ፍቃደኝነትን ያረጋገጠዉ

የጠያቂው ስምና ፊርማ _____

መጠየቁ የተሞላበት ቀን _____ የተጀመራበት ሰዓት _____

የተጠናቀቃበት ሰዓት _____

ስለመረጋገጡ

የተቆጣጣሪ ስምና ፍርማ _____

ቀን _____

ተ ቁጥር	ጥያቄ	አማራጭ መልሶች	መ ሸ ጋ ገሪ ያ	ኮ ድ
ክፍል አንድ: ማህበራዊ ስነ ህዝባዊ ገጽታዎችን በተመለከተ				
101	ጾታ	1 ወንድ 2 ሴት		
102	እድሜ በአመት	_____		
103	ሀይማኖት	1. አርቶዶክስ 2. ካቶሊክ 3. ፕሮተስታንት 4. ሙስሊም 5. ሌላ ካለ ይጥቀሱ _____		
104	የትምህርት ሁኔታ	1. ያልተማረ/ች 2. የመጀመሪያ ደረጃ ትምህርት/1-8/ 3. ሁለተኛ ደረጃ ትምህርት /ከ 9 – 12/		
105	የጋብቻ ሁኔታ	1 ያገባ/ች 2. ያላገባ/ች 3 የፈታ/ች		

		4 የሞተችበት/ባት		
106	የሙያ አይነት	1.ቆሻሻ ሰብሳቢ 2.መንገድ ጠራጊ 3. ቆሻሻን ከመኪና ላይ መጫንና ማውረድ 4. ቆሻሻን በየአይነቱ መለየት 5.ሌላ ካለ ይጠቀስ _____		
107	በስራ ቦታዎ ስንት ቀን ወይም ወር ወይም አመት አገለገሉ?	_____		
108	የወር ገቢ	_____ ብር		
ክፍል ሁለት ፡ የስራ ቦታ ጉዳትን በተመለከተ				
201	ባለፉት አስራ ሁለት ወራት ዉስጥ ከስራ ጋር በተያያዘ የደረሰብዎት ጉዳት አለ?	1 አዎ 2 የለም		
202	ለጥያቄ 201 መልስዎ አዎ ከሆነ ስንት ጊዜ?	1 አንድ ጊዜ 2 ከአንድ ጊዜ በላይ		
203	ባለፉት አራት ሳምንታት ዉስጥ ከስራ ጋር በተያያዘ የደረሰብዎት ጉዳት አለ?	1 አዎ 2 የለም		
204	ለጥያቄ 203 መልስዎ አዎ ከሆነ ስንት ጊዜ?	1 አንድ ጊዜ 2 ከአንድ ጊዜ በላይ		

205	በጉዳቱ የተጎዳው የሰውነት ክፍል	1. ኣይን 2. ከርን 3. ጉልበት 4. የእግር ጣት 5. ብሽሽት/ሽንጥ/ዳሌ 6. የእጅ ጣት 7. የላይኛው ክንድ 8. የታችኛው ክንድ 9. ከጉልበት በላይ ያለው የእግር ክፍል 10. ከጉልበት በታች ያለው የእግር ክፍል 11. ትከሻ 12. አንገት 13. ጀርባ 14. የተለያዩ የሰውነት ክፍሎች 15. ሌላ ካለ ይጠቀስ ----------		
206	የጉዳቱ ኣይነት	1. ጭረት 2. መቆረጥ 3. ቃጠሎ 4. መወጋት 5. ስብራት 6. ወለምታ 7. መናጋት/ውልቃት 8. ኣይን ላይ የደረሰ ጉዳት 9. የኣካል መጉደል 10. ሌላ ካለ የጠቀስ ----------	የኣጥንትና ጡንቻ ጉዳቶች	
207	የጉዳቱ ምክኒያት/መንስኤ	1. በሚዎድቁ እቃዎች በመመታት 2. በተፈናጣሪ ነገሮች 3. የእጅ መሳሪያዎች 4. መውደቅ		

		5. ከእቃ ጋር መጋጨት 6. ከባድ እቃዎችን በማንሳት 7. የማይመች የሰውነት አSSም 8. የተወረወሩ እቃዎች 9. የቆሻሻ ማጠራቀሚያን በመግፋት/በመጎተት 10. በእግር ብዙ በመÕዝ/ብዙ መንቀሳቀስ 11. መንሸራተት ወይም መደናቀፍ 12. በሁለት ወይም ከዚያ በላይ እቃዎች መጣበቅ/መቀጥቀጥ 13. ሌላ ካለ ይጠቀስ ----------		
208	አደጋው/ጉዳቱ የደረሰበት ወቅት	1. ክረምት 2. በጋ 3. በሁለቱም		
209	አደጋው/ጉዳቱ የደረሰበት ጊዜ	1. ጧት 2. ከሰዓት በኋላ 3. በሁለቱም ጊዜ		
210	ባለፉት አስራ ሁለት ወራት ስራ ና ስራ ነክ በሆኑ አደጋዎች/ጉዳቶች ምክንያት ከስራ የቀሩበት ቀን ብዛት	1. ከ 0 – 3 ቀን 2. ከ 3 ቀን በላይ		
ክፍል ሦሥት፡ የስራ ቦታን በተመለከተ				
301	በሳምንት ስንት ቀን ይሰራሉ			
302	በቀን ስንት ሰዓት ይሰራሉ			
303	የስራ ቦታ ደህንነትን በተመለከተ ሲቀጠሩም ሆነ በስራ ላይ እያሉ ስልጠና ወይም የግንዛቤ ማስጨበጫ ት/ት ወስደው ያውቃሉ	1. አዎን 2. የለም		
304	ቀጣሪ ድርጅትዎ	1. አዎን 2. የለም		

	የሰውነት/የአካል መከላከያ መሳሪያችን ይሰጥዎታል/ያቀርብልዎታል			
305	ለጥያቄ 304 መልስዎ አዎ ከሆነ ፤የትኞቹን	1. ቦቲ ጫማ 2. የእጅ Õንት 3. አደጋ መSSም የሚችል ሱሪ 4. የእራስ መከላከያ 5. መነጸር 6. የፊት መከላከያ 7. የስራ ልብስ 8. የአፍንጫ መከላከያ		
306	ለጥያቄ 304 መልስዎ አዎ ከሆነ የሰውነት/የአካል መከላከያ መሳሪያችን ሁልጊዜ ይጠቀማሉ	1. አዎን 2. የለም		
307	ለጥያቄ 306 መልስዎ አልጠቀምም ከሆነ ፤የማይጠቀሙበት ምክንያት ምንድን ነው	1. የመከላከያ መሳሪያዎቹ ባለመኖራቸው ምክንያት 2. የደህንነትና የጤና ት/ት ስለማይሰጥ 3. የመከላከያ መሳሪያዎቹ ለመጠቀም ምቹ ስላልሆኑ 4. የስራ አፈጻጸምን ስለሚቀንሱ 5. የደህንነትና የጤና ጠንቅ ሊያስከትሉ ስለሚችሉ 6. ጥራታቸው ጥሩ ስላልሆነ 7. ሌላ ካለ ይጠቀስ----------		
ክፍል አራት ፡ የሰራተኛውን ባህሪ በተመለከተ				
401	የአልኮል መጠጥ ጠጥተው ያውቃሉ	1. አዎን 2. የለም		
402	የሚጠጡ ከሆነ የትኛውን የመጠጥ አይነት	1. ቢራ 2. ዎይን 3. ጠላ 4. ጠጅ 5. አረቂ		

403	የሚጠጡ ከሆነ በሳምንት ምን ያክል ይጠጣሉ	--------- ጠርሙስ(ለቢራ፣ለወይን) -------- ጣሳ(ለጠላ) ---------- ብርሌ(ለጠጅ) ------- መለኪያ(ለአረቂ)/		
404	የአጠጣጥ ደረጃ	1.የማይጠጣ 2.መካከለኛ/መጠነኛ 3. ብዙ/ከባድ		
405	የእንቅልፍ ችግር (የእንቅልፍ መመዘኛ ቅጹን ይጠቀሙ)	1. ጤነኛ/ምንም ችግር የለብኝም 2. መጠነኛ የእንቅልፍ ችግር 3. ከፍተኛ ችግር		
406	በሚሰሩት ስራ ደስተኛ ነዎት(የስራ እርካታ መመዘኛ ቅጹን ይጠቀሙ)	1. ያልረካ/ች 2. የረካ/ች		

ይህ የጥያቄዎቻችን መጨረሻ ነው:: ጊዜዎን ሰውተው ስለተባበሩን ከልብ እናመሰግናለን::

ANNEX V: Measurement of some selected variables

I. Sleeping disorder

The SleepMed Insomnia Index (SMI) is used to measure the sleeping pattern of individuals by using SleepMed Insomnia Index questionnaire. It is designed to quick measure of insomnia symptoms in a simple and standardized way. The questions were formulated to address important sleep factors, including sleep latency, performance anxiety, first night effect, the frequency of awakenings, sleep re-initiation, total sleep time, perceived sleep quality and impact on next day function (Table 1).
In Question 1, individuals provide a global assessment of their sleep quality. Problems with sleep initiation and performance anxiety are revealed in Questions 2 and 3, respectively. The purpose of Question 4 is to determine arousal threshold and vigilance by assessing the impact of environmental factors on sleep. Question 5 provides insight into possible first night effects, accommodation abnormalities, or inadequate sleep hygiene. Sleep continuity is assessed in Questions 6 and 7, and Question 9 determines whether individuals perceive their sleep as adequate. Finally, next day consequences of sleep problems are examined in greater detail in Questions 8 and 10.

A weighting factor (0–4) is employed to discriminate individuals with no or minimal insomnia symptoms resulting in potential total scores from the 10 questions range from 0 (indicating no sleep-related problems) to 40 (suggesting significant insomnia-related complaints).

SMI has three categories.

- ✓ normal or sleepy individuals (SMI scores 0–10),
- ✓ non-sleepy individuals with nonrestortive sleep (SMI scores 11–20), and
- ✓ Insomnia individuals (SMI scores >20).

Table 1 SleepMed Insomnia Index questionnaire:

This is a test to assess, in general, how you are feeling about your sleep. Answer the following questions rating how you feel about your sleep using a 0–4 point scale with "0" representing no problem with your sleep and "4" representing a severe problem with how you feel about your sleep:

0 = No problem with my sleep

1 = Slight problem with my sleep

2 = Moderate problem with my sleep

3 = moderately severe problem with my

4 = Severe problem with my sleep affecting all parts of my life

S.N	SleepMed Insomnia Index questionnaire	Response options				
		0	1	2	3	4
1	Overall, describe your satisfaction with your sleep					
2	How easy is it for you to fall asleep?					
3	How worried are you that you won't be able to fall asleep?					
4	Are you easily awakened by sounds/noises in the night?					
5	When you sleep in a strange place or a bed other than your own, how much trouble do you have trying to fall asleep?					
6	Is your sleep disturbed by frequent awakenings?					
7	Can you fall back asleep if you awaken during the night?					
8	Are you rested the next day after your night's sleep?					
9	Do you think you are getting enough hours of sleep each night?					
10	How much does the quality of your sleep affect your next day function (ie, fatigue, mood, irritability)?					

Total Score (0–40points(52).

I. Job satisfaction

*Minnesota Satisfaction Questionnaire (*MSQ*)* is designed as instrument to assess workers satisfaction on their job. Each of the items of MSQ had four possible response items, each assigned an ordinal weight. Very Dissatisfied (VDS) was given an ordinal weight of 1, Dissatisfied (DS) was assigned an ordinal weight of 2, Satisfied (S) was given an ordinal weight of 3, and Very Satisfied (VS) was assigned an ordinal weight of 4. MSQ (short form) has 20 facets (areas) with five questions per facet. But for this project I used five facets out of 20 facets which have direct relation with MSWM. These are payment, work condition, fringe benefit, promotion and relation with coworkers. The overall sum of MSQ items is 25(i.e. 5x5) with four possible response items. Therefore, the total sum of satisfaction score is 100 (i.e. 25x4).The total sums of 25 – 37.50 indicate that the respondent is Very Dissatisfied, 37.6 – 62.50 represented the Dissatisfied Range, 62.60 – 87.50 indicated satisfied results, and scores between 87.60 and 100 indicated that the participant was Very Satisfied.

Table 2: Minnesota Satisfaction Questionnaire

This is a test to assess, in general, how you are feeling about your job. Answer the following questions rating how you feel about your job using a 1 – 4 point scale with “1” representing very dissatisfied with your job and “4” representing very satisfied with how you feel about your job.

1 - Very Dissatisfied,
2 - Dissatisfied,
3 - Satisfied and
4 - Very Satisfied

Scale items		Response options			
		1	2	3	4
Pay	1. the amount of pay for the work I do				
	2. the way I get full credit for the work I do				
	3. how my pay compares with that of similar jobs in other companies				
	4. the chance to make as much money as my friends				
	5. I feel unappreciated by the organization when I think about what they pay me.				
Work condition	1. My job security				
	2. The chance to do work that is well suited to my ability.				
	3. Pleasantness of the work condition				
	4. The chance to do my best at all time.				
	5. The freedom to use my own judgment.				
Fringe benefit	1. Social position in the community that goes with the job.				
	2. The chance to be important in the eyes of others				
	3. There are benefits we do not have which we should have.				
	4. The chance to do things that do not harm other people.				
	5. The benefits we receive are as good as most other organizations offer.				

Promotion	1. The opportunities for advancement for this job.				
	2. The way I am noticed when I do a good job.				
	3. The way my job provides for steady employment/promotion.				
	4. The way promotions are given out this job.				
	5. Those who do well on the job stand a fair chance of being promoted.				
Relation with coworkers	1. The sprite of cooperation among my coworkers.				
	2. The chance to develop close friend ships with my coworkers.				
	3. The way my coworkers get along with each other.				
	4. The friendliness of my coworkers.				
	5. There are too much bickering and fighting at work				

Total scores (25 – 100) (53-55).

II. Alcohol measurement

A. standard drink : A standard drink is equal to 13.7 grams of pure alcohol or

- 12-ounces of beer.
- 8-ounces of malt liquor.
- 5-ounces of wine.
- 1.5-ounces of distilled spirits or liquor (gin, rum, vodka, whiskey, areki etc).

(Conversion factor: 1 Milliliter = 0.0338140227 Ounces)

B. **Moderate drinking**: are generally defined as no more than 4 standard drinks in a single day for a healthy adult man with a maximum of no more than 14 drinks in a

given week. The limits for a healthy adult woman are up to 3 drinks in a single day and no more than 7 drinks in a given week.

C. **Heavy Drinking: men** who drink more than 4 standard drinks in a day (or more than 14 per week) and women who drink more than 3 in a day (or more than 7 per week) are at increased risk for alcohol-related problems(42, 56).

ANNEX VI: Amharic version of the measurements of some selected variables

I. የእንቅልፍ ችግር

ይህ የእንቅልፍዎትን ሁኔታ በተመለከተ መረጃ ለመሰብሰብ የተዘጋጀ መጠይቅ ነው፡፡ለሚከተሉትን ጥያቄዎች ከ0 – 4 ነጥብ በመስጠት የእንቅልፍዎን ሁኔታ በደረጃ ያስቀምጡ፡፡ዜሮ ማለት በእንቅልፍዎ ላይ ምንም ችግር የለም ሲሆን 4 ደግሞ ከፍተኛ ዎይም ጠንከር ያለ የእንቅልፍ ችግር አለብኝ ማለት ነው፡፡

0 - ምንም አይነት የእንቅልፍ ችግር የለብኝም፡፡

1 - ትንሽ ዎይም ቀለል ያለ የእንቅልፍ ችግር አለብኝ

2 - መጠነኛ ሆነ የእንቅልፍ ችግር አለብኝ

3 - በመጠኑ ጠንክር ያለ የእንቅልፍ ችግር አለብኝ

4- ጠንካራ ዎይም ከፍተኛ የእንቅልፍ ችግር አለብኝ

ተ.ቁ	የእንቅልፍዎን አጠቃላይ ሁኔታ የሚያሳዩ ጥያቄዎች	አማራጭ መልሶች				
		0	1	2	3	4
1	በእንቅልፍዎ የለዎት እርካታ					
2	ሲተኙ በቀላሉ እንቅልፍ ይዎስድዎታል					
3	እንቅልፍ አልዎስድዎት ሲል ይጨነቃሉ					
4	ከተኙ በኋላ በሚረብሽ ድምጽ በቀላሉ ይነቃሉ					
5	ከሌላ ሰው ዎይም የራስዎ ካልሆነ አልጋ ላይ ሲተኙ እንቅልፍ በቀላሉ ይዎስድዎታል					
6	እንቅልፍ ከዎሰደዎት በኋላ በተደጋጋሚ ይነቃሉ					
7	ከነቁ በኋላ መልሶ ይዎስድዎታል					
8	ከእንቅልፍዎ ሲነሱ በቀጣዩ ቀን ጥሩ ስሜት ይሰማዎታል					
9	በእያንዳንዳ ሌሊት በቂ የእንቅልፍ ሰዓት አለዎት					
10	የእንቅልፍዎ ሁኔታ የቀጣዩን ቀን ስራ ምን ያክል ያስተÕጉልብዎታል					

አጠቃላይ ውጤት ከ 0 – 40 ነጥብ

II. የስራ እርካታ

የሚንሶታ የስራ እርካታ ጥያቄ የሰራተኞችን በስራቸው ላይ ያላቸውን እርካታ የተዘጋጀ መጠይቅ ነው፡፡እያንጋንዱ ጥያቄ አራት እያንዳንዳቸው በቁጥር የተወሰኑ አማራጭ መልሶች አሉት፡፡በስራው በጣም ላልረካ/ካች 1 ሲሰጠው ላልረካ/ካች 2፣ለረካ/ካች 3፣ በጣም ለረካ/ካች 4 ይሰጣል፡፡**የሚንሶታ የስራ እርካታ ጥያቄ (አጭሩ ፎርም) 20 ክፍሎች** አሉት፡፡ እያንዳንዱ ክፍል በስሩ አምስት ጥያቄዎች ይይዛል፡፡ነገር ግን ለዚህ ጥናት የምጠቀምባቸው ከጥናቱና ጥናቱ ከሚደረግባቸው ሰዎች ጋር በቀጥታ የሚገናኙትን አምስቱን ክፍሎች ነው፡፡እነዚህም፡ክፍያ፣የስራ ሁኔታ፣ከስራ ቦታ ውጭ ያለው ጥቅም፣የስራ እድገትና ከስራ ባልደረቦች ጋር ያለው/ያለት ግንኙነት ናቸው፡፡አጠቃላይ የጥያቄዎች ብዛት 25(5x5) ይሆናል፡፡ስለዚህ ጠቅላላ የስራ እርካታ ዉጤት 100 (25x4) ይሆናል ማለት ነው፡፡ ከ 25 – 37.50 ያለው ውጤት ሰራተኛው በስራው/ዋ በጣም እንዳልረካ/ካች ሲያሳይ ከ 37.60 – 62.50 ያለው ሰራተኛው/ዋ እንዳልረካ/ካች፣ከ 62.60 – 87.50 ያለው ሰራተኛው/ዋ እንደረካ/ካች፣ ከ 87.60 – 100 ያለው ሰራተኛው/ዋ በጣም እንደረካ/ካች ያሳያል፡፡

ይህ በስራዎ ላይ ያለዎትን እርታ በተመለከተ መረጃ ለመስብሰብ የተዘጋጀ መጠይቅ ነው፡፡ለሚከተሉት ጥያቄዎች ከ 1 – 4 ነጥብ በመስጠት የእርካታዎን ሁኔታ በደረጃ ያስቀምጡ፡፡አንድ ማለት በስራዎ በጣም አልረኩም ሲሆን 4 ደግሞ በስራዎ በጣም ረክተዋል ማለት ነው፡፡

1 - በስራዬ በጣም አልረካሁም

2 - በስራዬ አልረካሁም

3 - በስራዬ ረክቻለሁ

4- በስራዬ በጣም ረክቻለሁ

መመዘኛ ጥያቄዎች		**አማራጭ መልሶች**			
		1	2	3	4
ክፍያ	1.ለሰሰራሁት ስራ የሚከፈለኝ ክፍያ				
	2.ለሰራሁት ስራ የሚሰጠኝ ምስጋና				
	3.የሚከፈለኝ ክፍያ ከሌሎች ተመሳሳይ ለሆኑ ስራዎች ከሚከፈለው ክፍያ ጋር ሲነጻጸር ምን ይመስላል				
	4.እንደÕደኞቸ ከፍተኛ ገቢ የማስገኘት እድል				
	5.ስለሚከፈለኝ ክፍያ ሳስብ በአሰሪዬ የምበረታታ አይመስለኝም				

የስራ ሁኔታ	1. የስራው ደህንነት				
	2.ለአቅሜ ሚመጥን ስራ መስራት እድል				
	3.የስራው ሁነታ አስደሳች ነው				
	4. በማንኛውም ሰዓት የራሴን ጥሩ የሆነ ነገር የመስራት እድል				
	5.ራሴን ውሳኔ ለመጠቀም ያለኝ ነጻነት				
ከስራ ቦታ ውጭ ያለው ጥቅም	1.ህብረተሰቡ ለስራው ያለው አመለካከት				
	2.በሌሎች ሰዎች አስፈላጊ የመሆን እድል				
	3.ልናገኝ የሚገባንን ጥቅም አላገኘንም				
	4.ሌሎች ሰዎችን የማይጎዳ ስራ የመስራት እድል				
	5.የምናገኛቸው ጥቅማጥቅሞች ሌሎች ድረጅቶች ከሚሰቸውጥቅማጥቅሞች ጋር ሲነጻጸር ጥሩ ነው				
የስራ እድገት	1.የእድገት እድል				
	2.ጥሩ ስራ ስሰራ የምበረታታበት መንገድ				
	3.ስራዬ ቀጣይነት/sሚ ሰራተኛ የመሆን እድል				
	4.እድገት የሚሰጥበት መንገድ				
	5.ጥሩ የሰሩ በትክክለኛ/ሚዛናዊ በሆነ መንገድ እድገት ያገኛሉ				
ከስራ ባልደረቦች ጋር ያለው/ያለት ግንኙነት	1.ከስራ ባልደረቦች መካከል ያለው የመተባበር መንፈስ				
	2. ከስራ ባልደረቦቼ ጋር ቅርብ/ጥብቅ የሆነ Õደኝነት የመመስረት እድል				
	3. በሰራተኞች መካከል ያለው አንድነት				
	4. የስራ ባልደረቦች ያላቸው ፍቅር				
	5.በስራ ቦታ ብዙ ጭቅጭቅና ጠብ አለ				

አጠቃላይ ውጤት (25 – 100)

Annex VIII: Map of study area

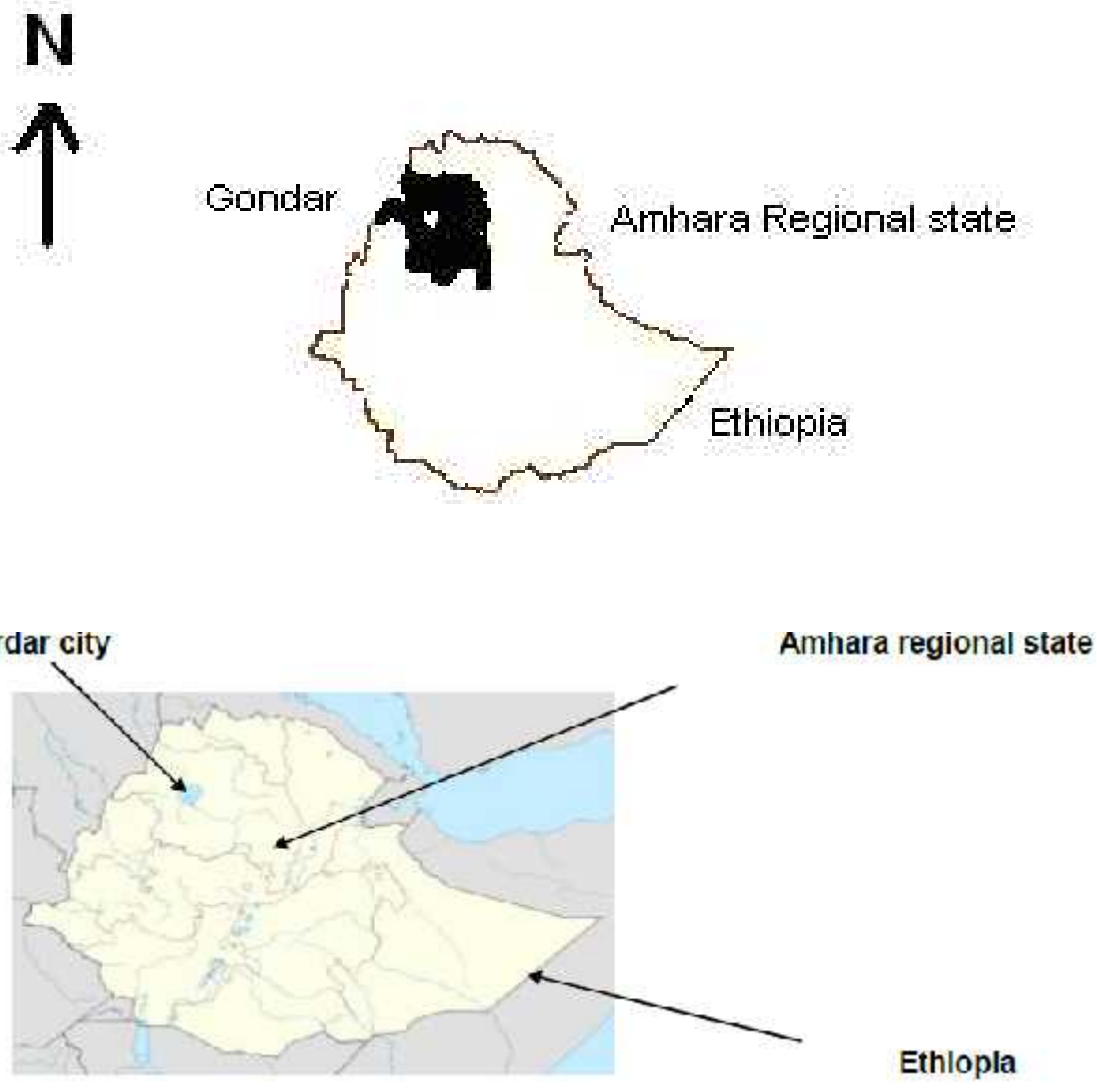


Figure 5: map of study area.

I, the under signed, senior MPH student declare that this thesis is my original work in partial fulfillment of the requirement for the degree of master in Public Health.

ZEMICHAEL GIZAW

Signature: ----------

Assurance of investigator

The undersigned agree to accept responsibility for the scientific, ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the research and publications office of the University of Gondar.

Student's Name: Zemichael Gizaw Date: _____ signature: _____

Approval of the advisors:

1. Mengesha adimasu (RS, MD, MPH, Professor) Date: _____ signature: _____

2. Messafint molla (RS, BSc, MPH) Date: _____ signature: _____